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*THE IMPORTANCE OF THE SALIVA IN GASTRIC DIGESTION.**

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It has long been known that the saliva plays an important part in gastric digestion, and that dyspeptic symptoms are apt to occur when the saliva is not swallowed. Thus, Wright,[1] in 1844, lost eleven pounds in weight while collecting two hundred and fifty drachms of saliva in one week. He considered the saliva to possess a stimulating influence on the stomach, and that this influence was specific. He based this upon the following experiment: The œsophagus of a dog was ligated, thus preventing any saliva from reaching the stomach, and a fistulous opening was made through which food was passed into the stomach. Meat thus introduced was poorly digested. When the œsophagus was unobstructed the meat was well digested.

Bidder and Schmidt,[2] in their classical experiments on digestion, found that ligation of the salivary ducts resulted in marked lowering of the acidity of the gastric contents of dogs.

Similar conclusions have been reached from clinical experience. Burserius restored a patient, who was greatly emaciated, to complete health by having him swallow his saliva.

The explanation of these phenomena seemed to depend upon the fact

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(discovered by Leuchs[3] in 1831) that saliva converted starch into sugar. It was claimed that the absence of amylolysis was itself sufficient to produce serious gastric derangement. These conclusions were, however, discredited by the work of Müller, Schwann, Beaumont, Purkinje, Vogel, and especially Claude-Bernard.[4] These investigators showed that the action of the saliva is immediately checked by the acid of the gastric juice; that its amylolytic action must be very slight, and, therefore, concluded that the saliva serves no other function than of assisting in deglutition and of moistening the food.

Schiff[5] believed that the saliva acts as a solvent of "peptogene," aiding in the liberation of pepsin.

Frerichs,[6] in his studies on the saliva, found that the amylolytic action of this secretion was very marked. He also noted that dyspeptic symptoms were produced when he had collected large quantities of his saliva for experimental purposes; he claimed that the saliva had a specific influence upon gastric secretion.

R. von den Velden,[7] who investigated this subject, still further showed that the diastatic action of ptyalin is lessened in the stomach in proportion to the degree of acidity. Inasmuch as the acidity is least marked at the beginning of gastric digestion, the conclusion was reached that the saliva retains its amylolytic action during the first stage of gastric digestion. He, therefore, divided gastric digestion into two stages: the first embraces that period in which free HCl is absent, and the saliva swallowed with the food still acts upon the starches; in the second, when free HCl is present, the ptyalin is no longer active.

The action of the diastatic ferment during gastric digestion was further investigated by Ellenberger and Hofmeister[8] upon the horse, and by Ewald and Boas[9] upon the human being; we, therefore, know that the saliva converts starches into dextrine and maltose in the stomach until the presence of free HCl puts an end to the process.

George Sticker[10] attempted to show that saliva exerted still another influence upon gastric digestion, and that this was of such a nature that an absence of salivary secretion not only resulted in an absence of amylolysis, but that the proteolysis was much retarded. He reported a case of a woman, sixty-two years of age, who had been suffering for half a year with great thirst and dryness of the mouth, and with marked indigestion, pressure in the stomach after meals, eructations, constipation, etc. Five hours after a Riegel's test-dinner the gastric contents were examined and showed marked retardation of the secretory function of the stomach, both as to hydrochloric acid and pepsin. After the use of jaborandi the salivary secretion was restored and the gastric disturbance entirely disappeared. He investigated the matter further by the following experiment: A test-breakfast was introduced into the stomach through a stomach-tube and care was taken to avoid swallowing any saliva. After two hours the stomach was found to contain large quantities, which gave a more marked iodine reaction,

showed less acidity and much less peptic strength than if the patient ate the breakfast and was allowed to swallow his saliva.

A. Schuld [11] studied the influence of the saliva upon the hydrochloric acid of the gastric juice upon himself and a patient with fully normal digestive powers. The test-meal was expressed at intervals of fifty, sixty, or seventy minutes. It consisted of zwiebach and tea or egg albumen with two-per-cent. starch solution. The determination of hydrochloric acid was made according to Leo's method. Schuld believes that the beneficial influence of saliva is due not to a specific influence of the saliva, but to a reflex influence produced by chewing and to the food remaining in the mouth, whereby its alkalinity or its acid reaction is weakened.

The experiments of Sticker were too few for definite conclusions, and E. Biernacki [12] (working in Riegel's clinic) continued the study of this subject. He utilized a test-breakfast consisting of from one hundred to two hundred cubic centimetres of a four-per-cent. solution of starch (*i.e.*, four to eight grammes of starch in one hundred and fifty to two hundred cubic centimetres of water), with twenty cubic centimetres of the white of raw egg, the total quantity of fluid being two hundred and seventy cubic centimetres.

The breakfast was removed one hour after ingestion. Other test-breakfasts, such as the white of the egg with sugar and water, or white of the egg with water or milk, were given as control experiments. The patient, while in a fasting condition, had his stomach washed out and then had the starch breakfast introduced through the tube, no saliva being swallowed for thirty minutes; at the end of this time the gastric contents were removed, the stomach again washed, and the patient allowed to swallow slowly the same quantity of the starch breakfast. The contents were again removed after thirty minutes, during which time the saliva was swallowed. In a number of experiments on normal persons he found that both the motor and secretory functions of the stomach are much better when the saliva is allowed to act. When the breakfast was swallowed together with the saliva the contents expressed were much less in quantity, usually about half, and these had a greater total acidity and more hydrochloric acid than in the first set of experiments. No marked differences were found in regard to the secretion of the pepsin ferment.

Under pathological conditions of the stomach the same results were usually obtained; sometimes, however, the gastric contents showed no difference whether the saliva was swallowed or not, and in rare cases the reverse resulted,—that is, the digestion was better when the food was introduced through the stomach-tube without saliva.

What was most remarkable, however, in these conditions of gastric disturbance were the great variations in the pepsin-digestion power, which was found much more active when the saliva had been swallowed with the breakfast.

Biernacki investigated this matter further in order to get an insight into

the causes of these variations. Quantities of saliva were added to the breakfast introduced through the tube in order to determine whether any beneficial effect was thus excited by the saliva. No effect was noted; the acidity and pepsin digestion were quite as low as in the control experiment, in which a breakfast alone was introduced through the tube.

In a further set of experiments a breakfast was masticated and then passed into the stomach through the stomach-tube, no saliva entering thereafter. The result was very striking, less gastric contents were obtained, and these were much richer in hydrochloric acid and of greater peptic power than in the control experiments without saliva. From this Biernacki concluded that the beneficial effect of the saliva is produced during the passage of the food through the mouth, and that the saliva swallowed after the passage of the food into the stomach has less influence.

In another series of experiments the saliva was heated to 85° C. for five minutes for the purpose of destroying the ptyalin, and yet the same beneficial action upon the digestion in the stomach was obtained. The ptyalin itself, therefore, is not sufficient to account for the beneficial action of the saliva in gastric digestion. That the production of dextrine is of no importance is shown by the fact that results are exactly the same when obtained with a breakfast of pure egg albumen.

A negative result was also obtained when KSCN was introduced through the stomach-tubes, saliva not being allowed to enter the stomach, thus excluding this ingredient of the saliva.

Biernacki thus comes to the conclusion that the beneficial effect of the *saliva must be due to its alkalinity, and, further, that the starchy alkaline breakfast is converted into a less alkaline medium by the action of the saliva.* He bases these conclusions upon the fact that if a small quantity of water be made slightly alkaline with a decinormal sodium hydrate solution and a red color produced by the addition of a few drops of phenolphthalein as indicator, the solution when shaken up in the mouth for a few minutes loses its color entirely. Working upon this theory (which I shall show to be erroneous), he attempts to demonstrate that, inasmuch as a neutral or slightly acid breakfast serves best to stimulate the process of gastric digestion, the beneficial effect of the saliva upon the gastric digestion is caused almost entirely by a change of reaction, the reaction becoming less alkaline, neutral, or slightly acid. The saliva would, therefore, have no specific action upon gastric digestion. The conclusions reached by Biernacki were so remarkable that it appeared to me that the subject demanded further investigation. In my investigations Biernacki's experiments were repeated. Breakfasts were utilized, consisting of white of egg and starch solution, egg and water, egg and water and sugar, in all cases an amount equal to two hundred and seventy cubic centimetres. The starch solution consisted of one hundred to two hundred cubic centimetres of a four-per-cent. solution of starch,—that is, four to eight grammes of starch boiled with one hundred and fifty to two hundred and fifty cubic centimetres of water and

twenty cubic centimetres of raw egg albumen then added. In the first series of experiments the breakfast was introduced through the stomach-tube after previous lavage. During the following half-hour the saliva was collected in a cup, and at the end of this time the gastric contents were expressed. The patient was now allowed to rest for fifteen minutes.

The stomach was then again washed out and the same quantity of a similar breakfast was swallowed, this time with the saliva. After one-half hour the gastric contents were removed and compared with those obtained in the previous experiment.

As daily variations in the motor and secretory functions of the stomach occur, the two experiments were made on the same day.

When milk was used as a test-breakfast it was removed at the end of an hour.

The character, quantity, and temperature of the two breakfasts were always the same in those cases in which comparisons were made. The advantage of the liquid breakfast lay in the fact that complete expression of the gastric contents may then be made; this in a measure is an index of the motor activity of the stomach.

With the starch breakfast it is easy to tell to what degree the breakfast has been acted upon by the saliva; for a blue color with Lugol's solution will show that the saliva has not come in contact with the starch. The gastric filtrate was tested with litmus, congo-paper, phloroglucin-vanillin (for free hydrochloric acid). The total acidity was estimated with one-tenth normal NaOH solution, phenolphthalein being used as indicator, and the hydrochloric acid determined by Boas's[13] modification of the Sjöquist method.

The peptic strength was determined by making the filtrate acid, and noting the time required for five cubic centimetres of gastric filtrate at 40° C. to dissolve a plate of fibrin. The degree of rennet activity was similarly estimated by placing five cubic centimetres of milk in five cubic centimetres of gastric contents (made neutral), and noting the time of caseine coagulation at 40° C.

The experiments were made upon four persons with perfectly normal digestion. Table I. contains,—

1. Number of experiments.
2. Date of experiments.
3. Test-breakfasts utilized; E representing egg albumen (twenty cubic centimetres); 100 to 250 S represents one hundred to two hundred and fifty cubic centimetres of a four-per-cent. solution of a cooked starch paste; 4 to 10 Z represents four to ten grammes of sugar; 100 to 50 W, one hundred to fifty cubic centimeters of water.
4. Amount obtained.
5. Reaction obtained with congo-paper.
6. Reaction for free hydrochloric acid with phloroglucin-vanillin.
7. Reaction for starch with Lugol's solution.

8. Acidity as determined by means of one-tenth NaOH solution, phenolphthalein being used as indicator.

9. Hydrochloric acid as determined by Sjöquist's method.

10. Pepsin digestion.

11. Rennet digestion.

12. Whether breakfast was swallowed with or without saliva.

The gastric contents expressed were always greater in quantity in those cases in which the saliva was not swallowed than when it was; the acidity and free HCl were always greater in quantity in the second instance than in the first. This is especially apparent in experiments in Table I., T. J., 1, 3, 5; M. T., 1, 3; F. E., 1, 3, 5, 7; P. G., 1, 5, 7.

On the other hand, no especial differences were noted under normal conditions in the pepsin digestion. The rennet activity seems to be somewhat more pronounced when the saliva had mingled with the breakfast than when it had not been swallowed. The conclusions derived from these experiments coincide completely with those of Biernacki,—namely, that the motor and secretory functions of the stomach in health are markedly better when the saliva has mingled with the breakfast than when the food has been introduced through a stomach-tube and kept free from the saliva. Similar experiments were made on eight cases of gastric disturbance of various kinds; the results obtained were in general the same as those found in healthy individuals. These cases comprise Table II. The secretory and motor functions of the stomach were in most cases markedly increased when the saliva mingled with the breakfast. In rare instances these functions were not influenced by the saliva, and even frequently both the motor and secretory action were decreased by the saliva.

In one case of atony, L. P., experiments 9 and 10, with normal acidity, the motor and secretory action of the stomach were greatly increased under the influence of the saliva, while in case K. L., experiments 23, 24, 25, 26, with subacidity, the saliva exerted no influence whatever. In one case of chronic gastritis, N. H., experiments 11, 12, 13, 14, the action of the saliva in promoting the motor and secretory functions of the stomach is markedly shown, while in another case, T. F., experiments 15, 16, 17, 18, neither the motor action nor the percentage of free hydrochloric acid were altered by the saliva. In a case, pulmonary tuberculosis (B. H., experiments 27, 28, 29, 30) with secondary catarrh of the stomach, both functions seemed to be decreased by the action of the saliva. In a case of nervous dyspepsia with a subacidity (C. F., 1, 2, 3, 4), the motor as well as the secretory functions are markedly increased by the presence of the saliva; while in a case of cancer of the stomach (O. T., 19, 20, 21, 22) there was no difference.

The effect of the saliva upon the activity of the pepsin and rennet ferments is of greater significance in pathological than in normal conditions. The pepsin and rennet ferments are more active when the saliva mingles

with the food than when it does not. Thus, in case L. P., experiments 9 and 10, it required six hours for the pepsin to digest a bit of albumen when the saliva had not mingled with the breakfast, while but two and three-fourths hours were needed to complete the process when the saliva came in contact with the food.

In case N. H., 11, 12, 13, 14, chronic gastritis, four and four and one-fourth hours were necessary for fibrin digestion when the saliva had mingled with the food, and seven and five hours when it had not.

Fifty and forty-five minutes were required to coagulate milk when the saliva had not been swallowed, twenty to fifteen when it had.

In case O. T., experiments 19, 20, 21, 22, cancer of the stomach, the conditions were reversed; for, while the figures four and three and three-fourths were obtained for the pepsin in the first instance without saliva, six and four were obtained in the second instances with saliva; and while it required thirty and twenty-five minutes to coagulate the milk in the first instances, fifty minutes were needed in the second instances.

These experiments show that the results thus far obtained by Biernacki are correct,—namely, that the saliva exerts a marked influence upon gastric digestion, increasing the motor and secretory action of the stomach, and that the saliva exerts a more important influence upon the secretion of the enzymes in the stomach in pathological conditions than in health.

Inasmuch as the test-breakfast in the first set of experiments was passed in quickly through the stomach-tube, and in the second, swallowed slowly, it was necessary to determine whether the beneficial effect in those cases in which the saliva was swallowed with the food was due to the previous introduction of the stomach-tube. For this reason a number of test-breakfasts were passed in succession through the tube into the stomach. In these experiments the digestive power was less marked in the second than in the first instant. (Table III.) After emptying the stomach for the second time more contents with a lessened percentage of hydrochloric acid were obtained than at first.

In order to determine in what manner and what part of the saliva takes part in this important process, a number of other experiments were performed.

A test-breakfast similar to the one above was used. In one set of experiments it was swallowed without saliva; in a second, saliva was added in varying proportions. (See Table IV.) Both breakfasts were passed into the stomach through the tube, no saliva being swallowed until the contents had been removed from the stomach. The saliva utilized was that collected a short while before its use. No special effect of the saliva upon gastric digestion was noted; both the motor and secretory functions of the stomach remained the same, notwithstanding the saliva had been added to the breakfast and introduced into the stomach through the tube, just as in the control experiments in which no saliva had been thus added.

In one experiment, No. 12, the breakfast was passed into the stomach

through the tube; the saliva was then swallowed for half an hour. In this case far better gastric digestion was manifested than in the control experiment No. 11. These experiments, therefore, make it manifest that we cannot consider the action of the saliva as acting purely mechanically upon the stomach. In another series of experiments (Table V.) the whole trial-breakfast was slowly and carefully masticated, and passed into the stomach through the tube; the effect was the same as if it had been swallowed. In all cases less gastric contents were obtained with much greater acidity and of greater peptic and rennet power than in the control experiment. The effect of the saliva as a factor in gastric digestion is therefore exerted mainly in the passage of the food through the mouth. The saliva swallowed afterwards exerts a much feebler influence than that swallowed with the food.

It was likewise important to determine whether the act of mastication in itself did not stimulate gastric digestion.

For this purpose (1) a breakfast was swallowed through the tube, and no saliva allowed to enter the stomach. At the end of half an hour the contents were expressed. (2) A second breakfast, exactly like the first, was similarly passed through the tube into the stomach, the person constantly masticating a bit of rubber for half an hour, the saliva, however, being collected and not swallowed. The gastric digestion was just as poor in the second case as in the first. The act of mastication in itself exerts no influence whatever upon gastric digestion. (See Table VI.)

In order to determine whether the effect of the saliva upon gastric digestion is only produced in the mouth by the saliva coming there in contact with the food, a series of experiments were performed in which, after having rubbed up a test-breakfast with forty-five cubic centimetres of saliva, previously collected, the breakfast was placed into the stomach through the tube, no saliva being swallowed. (Table VII.) It is seen that under these conditions the digestion in the stomach is just as poor as when, in the control experiment, the breakfast had been introduced into the stomach-tube without any saliva.

That the beneficial effect of the saliva upon gastric digestion is not due to the ptyalin is shown by the fact that when a breakfast is completely masticated and then placed in a beaker and heated to 80° C. for five minutes, thus destroying the ptyalin,[14] and then passed into the stomach, the beneficial effect is still very marked. (Table VIII.)

That the effect is not due to the change of the starch into sugar is shown by the fact that the beneficial effect of the saliva is also manifested when merely an albumin or albumin-sugar breakfast is ingested.

Biernacki has moreover shown that the change cannot be due to the sulphocyanide of potassium present in the saliva.

Biernacki attributes the salutary effect of the saliva to its alkalinity, and claims that, notwithstanding this quality, it converts the starchy alkaline breakfast into a *less alkaline* medium. He bases these conclusions on the fact that if twenty cubic centimetres of water are made alkaline with a one-

tenth normal sodium hydrate solution and a red color produced by the addition of a few drops of phenolphthalein as indicator, this solution when mixed up in the mouth for a few seconds loses its color entirely. He entirely ignores the fact that the slightest trace of carbon dioxide *will make an alkaline solution which has been previously colored by phenolphthalein colorless.* When the solution is boiled the red color immediately returns, though Biernacki makes a statement to the contrary. That the change of color of the alkaline phenolphthalein solution is merely dependent upon the presence of carbon dioxide in the solution, I have been able to show in a large number of cases. The decolorized fluid was placed in a test-tube connected with another tube containing lime-water; on boiling the solution the lime-water showed a turbidity indicating the presence of CO_2.

To show that the alkaline saliva does not in any way lessen the alkalinity of liquids placed in the mouth the following six experiments were performed.

Fifty cubic centimetres of boiled neutral distilled water were mixed up thoroughly in the mouth for one and one-half minutes; the solution was boiled to five cubic centimetres and the alkalinity determined, a freshly prepared solution of litmus being used as indicator.

The next morning, at the same hour, the same quantity of distilled water was made slightly alkaline with one-half cubic centimetre of one-tenth normal NaOH, and also mixed thoroughly in the mouth; the alkalinity being determined as before.

Finally, on the third morning the same procedure was gone through with, with an acid solution of one-half cubic centimetre of one-tenth normal HCl. The results obtained are as would be expected. The alkalinity of the alkaline solution was either very slightly increased or the same as at first. The acidity of the acid solution was of course diminished. These experiments were made on normal individuals. (Table IX.)

That slight changes in reaction of the food greatly affect the digestion in the stomach is shown by the following experiments, in which breakfasts of twenty cubic centimetres of egg albumen together with two hundred cubic centimetres of a four-per-cent. solution of starch and fifty cubic centimetres of water were utilized; the breakfasts were passed into the stomach through the tube, no saliva being swallowed.

In Table X. it is shown that a slightly neutral or acid breakfast is more quickly digested than one markedly alkaline. What effect the saliva has in producing these changes in reaction of the food remains to be solved.

It may be possible that the carbon dioxide, which is absorbed in the mouth, exerts considerable influence in promoting gastric digestion.

This is true except in experiments Nos. 19 and 20, showing that Na_2CO_3 acts differently from other alkalies, such as NaOH. It is probable, as Biernacki points out, that, while NaOH is acted on by the HCl of the gastric juice, thus, $NaOH + HCl = NaCl + H_2O$, the more NaOH present the more HCl is destroyed. The Na_2CO_3 also neutralizes the HCl, but CO_2

is constantly formed, which stimulates the mucous membrane of the stomach. Joworski[15] has also shown that CO_2 is an excellent stimulant to the gastric mucous membrane.

From these experiments it may be concluded,—

1. That the saliva exerts a marked beneficial effect upon gastric digestion in healthy as well as in pathological conditions.

2. That this effect is not due to the amylolytic action of the saliva, nor to the KSCN, nor to the presence of the ptyalin ferment. It is not due to the act of mastication.

3. The effect is produced on the food in its passage through the mouth, the saliva that is swallowed after the food is in the stomach having much less influence.

4. The reaction of the saliva exerts much influence in this respect, and it is possible that a part of the beneficial effect is obtained from the carbon dioxide swallowed.

TABLE I.—Normal Cases.

Name.	No.	Date.	Test-breakfast.	Amount.	Congo.	Phloroglucin-vanillin.	Iodine.	Acidity.	Per cent. of hydrochloric acid.	Pepsin,—hours.	Rennet,—minutes.	Remarks.
T. J.	1	July 20	1 E + 250 S	70	weak blue	no	strong	14	.04384	2½	.	without saliva
T. J.	2	July 20	1 E + 250 S	40	strong blue	reaction	none	30	.1220	2½	.	with saliva
T. J.	3	July 27	2 E + 250 W	50	not blue	no	. . . .	10	0.3852	2½	.	without saliva
T. J.	4	July 27	2 E + 250 W	20	blue	reaction	. . . .	60	0.1559	2½	.	with saliva
T. J.	5	July 30	1 E + 8 sugar + 250 W	60	weak blue	reaction	. . . .	22	0.0657	2½	.	without saliva
T. J.	6	July 30	. . . . .	30	weak blue	reaction	. . . .	38	0.1095	2½	.	with saliva
T. J.	7	July 31	1 E + 100 S + 150 W	75	no	no	blue	12	0.0365	2½	25	without saliva
T. J.	8	July 31	. . . . .	40	weak blue	no	no	28	0.0625	2	20	with saliva
M. T.	1	Aug. 7	1 E + 200 S + 50 H_2O	100	no	no	blue	24	0.0326	2	.	without saliva
M. T.	2	Aug. 7	1 E + 200 S + 50 H_2O	30	yes	reaction	no	62	0.1345	1½	.	with saliva
M. T.	3	Aug. 9	1 E + 100 S + 150 H_2O	90	no	no	blue	14	0.0318	2	35	without saliva
M. T.	4	Aug. 9	. . . . .	30	weak blue	no	no	35	0 0972	1½	20	with saliva
F. E.	1	July 30	2 E + 250 W	60	no	no	. . . .	25	0.07305	2	.	without saliva
F. E.	2	July 30	2 E + 250 W	45	weak blue	reaction	. . . .	42	0 11795	2½	.	with saliva
F. E.	3	July 31	1 E + 100 S + 150 W	100	reaction	reaction	blue	28	0.0766	2½	.	without saliva
F. E.	4	July 31	. . . . .	35	strong	reaction	no	52	0.10585	2½	.	with saliva
F. E.	5	Aug. 12	1 E + 250 S	60	reaction	no	blue	18	0.05840	2	.	without saliva
F. E.	6	Aug. 12	. . . . .	30	strong	reaction	no	38	0.01180	1½	.	with saliva
F. E.	7	Aug. 6	1 E + 250 W + 8 sugar	50	weak	no	. . . .	21	0.05716	2½	.	without saliva
F. E.	8	Aug. 6	. . . . .	25	strong	reaction	. . . .	42	0.13213	2	.	with saliva
P. G.	1	Aug. 8	2 E + 250 W	65	weak blue	no	. . . .	17	0 03264	2	.	without saliva
P. G.	2	Aug. 8	2 E + 250 W	30	strong blue	reaction	. . . .	51	0.10562	2½	.	with saliva
P. G.	3	Aug. 10	1 E + 100 S + 150 W	90	no	no	strong	13	0.02011	2½	30	without saliva
P. G.	4	Aug. 10	. . . . .	25	no	no	no	30	0.09875	2½	25	with saliva
P. G.	5	Aug. 12	1 E + 250 S	60	no	no	strong	20	0,04797	3	45	without saliva
P. G.	6	Aug. 12	. . . . .	30	weak	no	weak	50	0.10987	2½	25	with saliva
P. G.	7	Aug. 14	1 E + 250 H_2O + 8 sugar	100	weak blue	reaction	. . . .	22	0.03239	2½	.	without saliva
P. G.	8	Aug. 14	. . . . .	20	strong blue	reaction	. . . .	60	0.11799	2½	.	with saliva

TABLE II.—Pathological Cases.

No.	Date.	Name.	Diagnosis.	Test-breakfast.	Amount.	Congo.	Phloroglucin-vanillin.	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin,—hours.	Rennet,—minutes.	Remarks.
1	Aug. 4	C. F.	nervous dyspepsia	1 E + 200 S + 50 water	45	no	no	blue	16	.05110	2¼	45	without saliva
2	Aug. 4	C. F.	. . . . .	. . . . .	15	no	no	no	28	.08395	2	30	with saliva
3	Aug. 20	C. F.	subacidity	250 c.c. of milk	50	no	no	. . . . .	21	.05297	2¾	40	without saliva
4	Aug. 20	C. F.	. . . . .	. . . . .	10	no	no	. . . . .	53	.07972	2	30	with saliva
5	Aug. 4	M. S.	hyperacidity	1 E + 200 S + 50 W	45	blue	yes	blue	56	.16790	2	.	without saliva
6	Aug. 4	M. S.	ulcer (?)	. . . . .	20	blue	yes	no	38	.10950	2	.	with saliva
7	Aug. 20	M. S.	. . . . .	250 c.c. milk	50	blue	yes	. . . . .	57	.14286	2¼	.	without saliva
8	Aug. 20	M. S.	. . . . .	. . . . .	25	blue	yes	. . . . .	45	.13462	2	.	with saliva
9	Aug. 4	L. P.	atony	1 E + 200 S + 50 W	45	blue	yes	weak blue	10	.03128	6	.	without saliva
10	Aug. 4	L. P.	. . . . .	. . . . .	15	blue	yes	no	32	.10585	2¾	.	with saliva
11	Aug. 4	N. H.	chronic gastritis	1 E + 200 S + 50 H_2O	50	no	no	weak blue	5	.00912	7	50	without saliva
12	Aug. 4	N. H.	. . . . .	. . . . .	25	no	no	no	10	.02701	4	20	with saliva
13	Aug. 9	N. H.	. . . . .	250 c.c. milk	35	no	no	. . . . .	20	.00816	5	45	without saliva
14	Aug. 9	N. H.	. . . . .	. . . . .	20	no	no	. . . . .	17	.01243	4½	15	with saliva
15	Aug. 3	T. F.	chronic gastritis	1 E + 200 S + 50 W	15	no	no	blue	16	.00876	8	50	without saliva
16	Aug. 3	T. F.	. . . . .	. . . . .	25	no	no	no	12	.00899	4	20	with saliva
17	Aug. 10	T. F.	. . . . .	250 c.c. milk	20	no	no	. . . . .	8	.00769	7	.	without saliva
18	Aug. 10	T. F.	. . . . .	. . . . .	25	no	no	. . . . .	12	.00899	2¾	.	with saliva
19	Aug. 14	O. T.	cancer ventriculi	1 E + 200 S + 50 H_2O	25	weak blue	no	yes	14	.00312	4	30	without saliva
20	Aug. 14	O. T.	. . . . .	. . . . .	25	blue	no	no	12	.00324	6	50	with saliva
21	Aug. 17	O. T.	. . . . .	250 c.c. milk	35	weak blue	no	. . . . .	17	.00259	3¾	25	without saliva
22	Aug. 17	O. T.	. . . . .	250 c.c. milk	30	weak blue	no	. . . . .	13	.00276	4	50	with saliva
23	Oct. 15	K. L.	atony	1 + 200 S + 50 W	40	no	no	yes	13	.03874	3	50	without saliva
24	Oct. 15	K. L.	subacidity	. . . . .	50	no	no	no	14	.03923	3	55	with saliva
25	Oct. 22	K. L.	. . . . .	250 c.c. milk	60	no	no	. . . . .	12	.04382	3	.	without saliva
26	Oct. 22	K. L.	. . . . .	. . . . .	70	no	no	. . . . .	8	.03187	3	.	with saliva
27	Oct. 22	B. H.	pulmonary tuber-	1 E + 200 S + 50 W	20	no	no	slight blue	16	.08724	2¾	35	without saliva
28	Oct. 22	B. H.	culosis, with sec-	. . . . .	45	no	no	slight blue	8	.09469	2	20	with saliva
29	Oct. 27	B. H.	ondary gastric	250 c.c. milk	25	no	no	. . . . .	20	.09587	2¼	30	without saliva
30	Oct. 27	B. H.	catarrh.	. . . . .	55	no	no	. . . . .	9	.09974	2	20	with saliva

For control both breakfasts were introduced into the stomach through the tube.

TABLE III.

Name.	No.	Date.	Test-breakfast.	Amount.	Congo.	Phloroglucin-vanillin.	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin,—hours.	Rennet,—minutes.	Remarks.
T. J.	1	Aug. 1	1 E + 250 S	30	slight blue	no	strong	21	.0752	2¼	30	without saliva
T. J.	2	Aug. 1	. . . . .	55	slight blue	no	strong	24	.0527	2¼	30	without saliva
T. J.	3	Aug. 2	1 E + 200 S + 50 W	20	blue	yes	strong	18	.0789	2¼	.	without saliva
T. J.	4	Aug. 2	. . . . .	25	blue	yes	strong	14	.0791	2¼	.	without saliva
T. J.	5	Aug. 3	1 E + 200 S + 50 W	25	slight blue	no	strong	16	.07875	2¼	30	without saliva
T. J.	6	Aug. 3	. . . . .	45	slight blue	no	strong	15	.03891	2¼	35	without saliva

In the first experiment the breakfast was passed into the stomach without saliva; in a second, saliva was added in varying proportions.

TABLE IV.

Name.	No.	Date.	Breakfast.	Quantity.	Congo.	Phloroglucin-vanillin.	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin,—hours.	Rennet,—minutes.	Remarks.
T. J.	1	Aug. 4	1 E + 150 S + 100 H_2O	35	slight blue	none	strong	18	.05840	3	.	passed through tube
T. J.	2	Aug. 4	same with 15 c.c. saliva	35	slight blue	none	none	20	.04935	3	.	passed through tube
T. J.	3	Aug. 5	1 E + 150 S + 100 H_2O	25	not	none	strong	27	.03285	2½	.	passed through tube
T. J.	4	Aug. 5	same with 25 c.c. saliva	35	not	none	none	20	.04197	2½	.	passed through tube
T. J.	5	Aug. 6	1 E + 150 S + 100 H_2O	70	slight	none	strong	20	.06225	3	30	passed through tube
T. J.	6	Aug. 6	same with 35 c.c. saliva	60	not	none	none	25	.04297	2½	30	passed through tube
T. J.	7	Aug. 7	1 E + 150 S + 100 H_2O	50	slight	none	slight	21	.04837	2	.	passed through tube
T. J.	8	Aug. 7	same with 45 c.c. saliva	30	reaction	none	none	20	.04874	2	.	passed through tube
T. J.	9	Aug. 9	1 E + 150 S + 100 H_2O	40	not	none	strong	16	.03347	2½	35	passed through tube
T. J.	10	Aug. 9	same with 50 c.c. saliva	40	not	none	slight	19	.03931	2½	35	passed through tube
T. J.	11	Aug. 11	1 E + 150 S + 100 H_2O	45	not	none	strong	14	.03864	3¼	45	passed through tube
T. J.	12	Aug. 11	same with saliva after	25	not	none	none	29	.04112	2¾	25	passed through tube

In the first instance the breakfast was passed into the stomach through the tube; in the second it was masticated, and then passed into the stomach through the tube.

TABLE V.

Name.	No.	Date.	Breakfast.	Quantity.	Congo.	Phloro-glucin-vanillin.	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin: hours.	Rennet: minutes.
T. J.	1	Aug. 16	1 E + 250 S	90	not.	not	strong	18	.04279	2½	. .
T. J.	2	Aug. 16	1 E + 250 S	35	weak blue	yes	no	32	.09917	2	. .
T. J.	3	Aug. 17	2 E + 250 W	55	weak blue	no	. . .	10	.02102	3	35
T. J.	4	Aug. 17	2 E + 250 W	25	weak blue	no	. . .	13	.05778	2	20
T. J.	5	Aug. 19	1 E + 8 Sugar	70	not blue	no	. . .	17	.05989	2½	. .
T. J.	6	Aug. 19	+ 250 W	40	blue	reaction	. . .	40	.10295	2¼	. .
T. J.	7	Aug. 20	1 E + 100 S	60	weak blue	no	strong	12	.04689	3¼	. .
T. J.	8	Aug. 20	+ 150 W	40	strong blue	strong	no	64	.12731	2	. .

TABLE VI.

Name.	No.	Date.	Breakfast.	Quantity.	Congo.	Phloro-glucin-vanillin	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin: hours.	Rennet: minutes.
T. J.	1	Aug. 31	1 E + 100 S	70	weak blue	no	strong	14	.03179	2	30
T. J.	2	Aug. 31	+ 150 W	65	no	no	strong	17	.03286	2	30
T. J.	3	Sept. 2	1 E + 250 S	80	weak blue	no	strong	16	.05427	2¼	30
T. J.	4	Sept. 2	. . . . .	80	weak blue	no	strong	18	.06891	2½	30
T. J.	5	Sept. 4	2 E + 250 W	70	no	no	. . .	20	.05279	2¾	30
T. J.	6	Sept. 4	. . . . .	60	no	no	. . .	19	.04342	2¼	35
T. J.	7	Sept. 5	1 E + 8 Sugar	65	no	no	. . .	19	.04617	2½	30
T. J.	8	Sept. 5	+ 250 W	70	weak blue	no	. . .	22	.05213	2	30

In the first instance the breakfast was swallowed through the tube, no saliva being allowed to enter the stomach; in the second instance a similar breakfast was passed through the tube into the stomach, the person constantly masticating a bit of rubber for half an hour, the saliva, however, being collected, not swallowed.

TABLE VII.

Name.	No.	Date.	Breakfast.	Quantity.	Congo.	Phloroglucin-vanillin.	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin,—hours.	Rennet,—minutes.	Remarks.
T. J.	1	Aug. 21	1 E + 250 S	55	slight	no	strong	21	.06874	2½	30	through stomach-tube
T. J.	2	Aug. 21	. . . . .	30	no	no	no	25	.06982	2½	35	through tube, 45 c.c. saliva being added
T. J.	3	Aug. 22	1 E + 100 S +	35	no	no	strong	20	.06954	2½	35	through tube
T. J.	4	Aug. 22	150 W	45	no	no	no	19	.06721	2½	45	through tube, with 45 c.c. saliva
T. J.	5	Aug. 23	2 E + W	40	slight	no	. . .	24	.04543	2½	35	through tube
T. J.	6	Aug. 23	. . . . .	50	slight	no	. . .	27	.07216	2½	35	through tube, with 45 c.c. of saliva
T. J.	7	Aug. 25	1 E + 8 S	35	no	not	. . .	18	.05431	2½	40	through tube
T. J.	8	Aug. 25	+ 250 W	35	no	not	. . .	25	.05924	2½	35	through tube, with 45 c.c. saliva

In the first instance the breakfast was passed into the stomach through the tube, no saliva being swallowed; in the second instance forty-five cubic centimetres of saliva were rubbed up with the breakfast and passed into the stomach through the tube, no saliva being swallowed.

TABLE VIII.

Name.	No.	Date.	Breakfast.	Quantity.	Congo.	Phloro-glucin-vanillin.	Iodine.	Acidity.	Percentage of hydro-chloric acid.	Pepsin : hours.
T. J.	1	Aug. 27	1 E + 250 S	70	not blue	no	strong	16	.05987	2½
T. J.	2	. . .	. . . . .	25	blue	yes	no	32	.09874	2
T. J.	3	Aug. 29	1 E + 100 S + 150 W	60	weak blue	no	strong	14	.03172	2½
T. J.	4	. . .	. . . . .	30	strong blue	yes	no	40	.09982	2¼

In the first instance the test-breakfast was passed into the stomach through the tube; in the second it was first masticated, then placed in a beaker and heated to 80° C. for five minutes, thus destroying the ptyalin, and then passed into the stomach through the tube.

TABLE IX.

Cases.	50 c.c. water mixed in mouth, and then evaporated down to 5 c.c.,—alkalinity.	50 c. c. of water, with 0.5 $\frac{1}{10}$ NaOH, mixed in mouth, and evaporated down to 5 c.c.,—alkalinity.	50 c.c., with 0.5 $\frac{1}{10}$ HCl mixed in mouth and evaporated down to 5 c.c.
1	12	14	8
2	16	18	10
3	10	11	6

Test-breakfast of twenty cubic centimetres egg-albumen with two hundred cubic centimetres of four-per-cent. solution of starch and fifty cubic centimetres of water.

TABLE X.

No.	Date.	Breakfast.	Quantity.	Congo.	Phloro-glucin-vanillin.	Iodine.	Acidity.	Percentage of hydrochloric acid.	Pepsin: hours.
1	Oct. 3	alkalinity 1.5	100	no	no	yes	21	.0673	2¼
2	Oct. 3	neutral	25	yes	yes	yes	44	.1397	2
3	Oct. 4	alkalinity 1.5	85	weak	no	yes	19	.0594	2¼
4	Oct. 4	acidity 0.5 HCl, $\frac{1}{10}$ normal	30	yes	yes	yes	49	.0981	2¼
5	Oct. 5	alkalinity 1.5	80	weak	no	yes	15	.0587	2¼
6	Oct. 5	acidity 10, $\frac{1}{10}$ normal HCl	35	yes	yes	yes	45	.1124	2
7	Oct. 6	alkalinity 1.5	90	weak	no	yes	17	.0592	2
8	Oct. 6	acidity 2	35	yes	yes	yes	51	.1198	2
9	Oct. 7	alkalinity 1.5	90	weak	no	yes	19	.0587	2¼
10	Oct. 7	acidity 6	80	weak	no	yes	21	.0652	2¼
11	Oct. 8	alkalinity 1.5, $\frac{1}{10}$ NaOH 1	75	weak	no	yes	18	.06942	2¼
12	Oct. 8	. . . . .	30	yes	yes	yes	41	.9259	2
13	Oct. 9	alkalinity 1.5, $\frac{1}{10}$ NaOH 0.5	80	yes	slight	yes	21	.0792	2¼
14	Oct. 9	. . . . .	25	yes	yes	yes	49	.0987	2
15	Oct. 10	alkalinity 1.5, $\frac{1}{10}$ NaOH 2.5	85	yes	yes	yes	25	.0828	2¼
16	Oct. 10	. . . . .	90	yes	yes	yes	23	.0718	2¼
17	Oct. 11	alkalinity 1.5, $\frac{1}{10}$ NaOH 2.5	75	yes	yes	yes	26	.06893	2¼
18	Oct. 11	. . . . .	100	weak	slight	yes	14	.02846	2
19	Oct. 12	alkalinity 1.5, Na_2CO_3 2.5	90	yes	slight	yes	21	.97286	2¼
20	Oct. 12	. . . . .	20	yes	yes	yes	30	.08147	2

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CHILDREN OF FEEBLE RESISTANCE: THEIR CARE AND MANAGEMENT.

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A LARGE class of cases, sufficiently distinct to be described by themselves and to be very thoughtfully considered, are feeble children. The phenomena of disease and the remedies accepted as suitable, therefore, are usually outlined for the average child, with occasional and insufficient reference, usually most casual, to those of the weaker sort, who may or should be rare exceptions. For the first, the robust entities, knowledge has attained somewhat respectable proportions, and results may be safely and confidently predicted, and on the whole realized to the satisfaction of all immediately concerned. It is among the latter that surprises arise, producing confusion and occasional dismay, the results of which react, unfortunately, too often upon the physician.

It may be said, then, that an exceedingly useful item of equipment to the adviser or lover of children is a prompt and accurate appreciation of the marks of defective resistance, and it is a conspicuous evidence of wisdom to predicate how and when these may be so handled as to produce known results, be these good or bad.

Feeble children, as I use the term here, are those who are below the normal in their resistance to the numberless and unceasing hurtful agencies which must be met and overcome throughout the length of an ordinary span of life. Some children are beset accidentally with more perils and baneful conditions than others, but because they possess larger inherent vitality, vigor, reparative power, or howsoever this quality of resistance may be described, pass through successfully what casts others out of the running, for shorter or longer periods of time.

This quality of feeble resistance, negative though it be, is a powerful factor, which requires the gravest consideration at all times, and is one of the fundamental points on which to base prognosis and modify treatment. It also requires special consideration and treatment for itself that the vital forces may, as indeed they can, be improved and strengthened by judicious measures. Thus is the individual improved and a second generation raised to a higher plane, or at least thus may we limit what had otherwise been an inevitable decadence.

The medical adviser often fails of his duty here, he being too content with the application of remedies to obvious disturbances,—certainly a more limited view than the trend of modern medicine can justify. He should assume the privilege—indeed the responsibility is mainly his—of doing much more than this. He may not, as society is now constructed, have it in his power to aid in the selection and mating of the parents. Attempts to go so far would be met with swift and dire reprimand, as some of us have found to our cost. The time may come when his advice shall be sought even here, to the profound betterment of the race. This will be a probable outcome of our growing knowledge of inheritance and predisposition.

The study of degeneracy may yet be fruitful of good results, even though it flare out in the bombastic ravings of certain noisy fellows exploding here and there in popular books adjusted to the morbid cravings of the current journalistic demands.

A general interest in and popular knowledge of the marks and dangers of the degenerate individuals is a hopeful ground, out of which may grow, conscious or unconscious, selection among human beings.

Among animals instinctive selection is the rule. It is left for human beings to be influenced far more by whimsical, or social, or pecuniary considerations, whereby the race is kept at a lower level through propagation from inferior specimens, or at any rate not the best ones.

We may at least hope for reformation on these lines as knowledge of the causes and results of injudicious marriages becomes fashionable.

But it is the part of wisdom to bear in mind that the attempts of individuals to thus exert influence is both doubtful and perilous (to the reformer). Meanwhile, we must study the material under our hands and continue to hope for co-operative effort by slow degrees.

We Americans have drawn heavily on our heritage of intrinsic vigor had from our European ancestors and supplemented by the vitalizing life of pioneer days, and are now accused of being on the verge of a decadence. This may not be altogether true, and statistics do not support that view. Certainly the average staying power of the native-born population is among the best. Unfortunately, the steady additions now made to our ranks are no longer chiefly the sturdy seekers for "open room and verge enough" wherein to swing the axe or drive the plough, but are in great measure degenerate and criminal offscourings from European nations, who are wise enough to rid themselves of such rubbish.

This intermingling infects our wholesome stock with various hurtful racial, neurotic, and nutritional peculiarities, tendencies, and diseases. The influence of all this must be ceaselessly watched and guarded against wherever possible. Mixed races are proverbially feebler than peoples of pure stock, conspicuous in the adulteration of the white with various colored races, and this is also seen in the American wherever several nationalities fuse.

City life is of itself unwholesome and devitalizing to those who remain under the conditions of overcrowding, inevitable in large centres of population. And all this, too, quite independently of the more obvious or tangible hurtfulness of inferior hygiene, poor food, defective light and air. The unconscious agitation of the molecules induced by ceaseless hurry, swift movements of objects all about, noises, sights and sounds, the jarring of the very houses from perpetually passing ponderous vans and street-cars, and endless other elements of unrest, wears and wearies and exhausts.

Not long since a patient of mine, a child with typhoid fever, became quite delirious, almost comatose, and the "strike" of the trolly men came on. The temperature thereupon went steadily down almost to normal, though acute consciousness did not return. Suddenly the "strike was off," and the thundering, clanging cars began their racket, and at once the temperature rose to 104° F., giving us great alarm, though the child seemed not to recognize the noise at all.

Notwithstanding the many menaces in the outlook for our American people, we are demonstrated to be, on the whole, steadily improving as a race. The filthy gutter-stream poured into our clean waters not only is amply diluted, but some blessed inherent qualities of our soil induces steady subsidence.

Moreover, the inevitable exhaustion which was showing in us, the outcome of our earliest years of intense struggle in all ways and producing a sad crop of neurasthenics of all grades and types, is being again overcome by improved modes of living and conserving of energies. One of the most effectual of these is our better appreciation of *leisure*, a word only recently introduced into American "vocabulary." Regular and frequent outings become more generally recognized as imperative among our "hustlers," the working years of the bread-winners are notably increased, and above all the second generation shows more evidence of surviving.

But it is vain to expect a restoration to the plane of initial vigor which our English cousins enjoy (who can still boast a higher per cent. of staying power than we), short of several generations, pursuing proper modes of work and play suitably combined. It should be our aim, however, to acquire in our own persons and for our children that invaluable possession, a predisposition to be and remain strong, through which we may triumph over endless depressing influences.

Individual susceptibility shown to poisons, medicines, irritants, and foods warrants a passing remark.

Among the conspicuous illustrations of feebleness is the curious and unaccountable disturbances set up by relatively innocent things in children of low vitality. To be sure, in the history, very many times there is a grain of wheat in a whole measure of chaff, and many of the peculiarities claimed by fond mothers are partly imagined and partly an hysterical overgrowth. Nevertheless, there are many clearly-marked idiosyncrasies which must be duly considered whenever a prescription is written or a regimen outlined. Children bear some drugs in doses which as adults they could not endure. The use of these should then be in ampler doses to secure a desired effect.

The susceptibility to digestive or other disturbances caused by ordinary foods is, however, of more importance in this research.

A family of eight children among whom I have grown up cannot take cow's milk without suffering a sharp gastritis. A baby of one of these was most difficult to feed during an attack of mastitis in the mother, and even the selection of a wet-nurse was a grave problem. In other respects it was entirely vigorous and throve famously upon the mother's recovery. In another lad the mere tasting of hen's eggs, and it may be of other varieties, sets up a violent poisoning (stomatitis) in a few minutes, no matter how small the amount or perfectly concealed. Acute œdema of the mucous membranes is produced and urticaria so severe, and of the glottis twice, that the dyspnœa imperilled life. Susceptibilities to the action of sweets, certain berries, as the strawberry and raspberry, the presence of some flowers, are matters of common knowledge. The effect of heat, especially that of the sun, is dangerous to many, naturally in infants, and deserves more than merely a passing allusion. Sea-air, or rather the atmosphere at the very edge of the sea, which may involve several factors, is disastrous to some little folk. I am of the opinion that much of this is dependent upon perpetual small concussions, either conveyed through the air, especially through sense organs, or the rhythmical beat of the surf, transferred like bone conductions along the shore to the sufferer. One family of my acquaintance have tried again and again to overcome this apparent frailty, but are forced inland (a single mile will do), or else they become exhausted. In other cases altitude is hurtful, and quite independent of such local weaknesses as catarrhal states, emphysema, or dilated hearts. The dampness of some localities causes great distress to some, while for others a marked dryness is equally disturbing. Goethe relates how he was made ill by a deadly odor which assailed him whenever he visited Schiller, until he found that the latter poet felt a craving or need for the presence of apples, and these he kept in various stages of decomposition in a bureau-drawer of his study. Many persons are known to faint without knowing why if a mouse be in a room, or to feel similarly affected by some other animal.

The marks of feebleness are manifold; far too numerous and varied to discuss at length, and obvious usually to a watchful person, medical or lay. No one nor one dozen symptoms are competent to designate so variable a state, and no enumeration of points of organic depreciation would make the

matter clear, unless described with large attention to side-lights and modifications or upon the case in clinic fashion. Experience with or the accurate histories of patients is needed to form the judgment. A loss of interest in surrounding objects may mean physical or mental defect, but not indeed unless many other points are estimated. An excitable idiot takes a vivid interest in everything in sight only; this is obviously the reverse of intelligence, and is seldom sustained. Scant endurance or limited staying power is a notable mark of frailty, though this gives little knowledge of relative susceptibility to disease.

Again, an important study is the critical periods in development and how they vary in different individuals,—a large research in itself. It is a common experience to note a sudden stop in wholesome progress, mental or physical, or sudden leaps and bounds in the right direction, or surprises as to one side,—oblique progress not always to be welcomed and only moderately controllable. Precocity is at one end of this line, premature senility at the other. Sudden advances are occasionally made which astonish observers as well as delight parents, the result being, perhaps, in the end admirable. The curiosities of stature growth are now and again startling and disconcerting, especially when the tall child suddenly stops in the midst of right increments, and, on the other hand, when one in whose size great satisfaction is felt, suddenly shoots up to the proportions of a light-house. Here there may be no possibility of control, but I decline to believe it. There must be means to control some of these extreme variations, and we shall yet find and apply them. The interesting point here is the relativity of the vital organs. The suddenly tall person probably has no proportionate growth of heart and lungs and therein is frail. The short folk are again often seen to be obviously built for great size, and consequently possess, presumably, bigger and more forceful organs. Indeed, the strongest men are short, and tall men are rarely long lived or very enduring.

Great progress has been made in conserving the gross vitality of the race. In this, the expectation of life, the average length has advanced markedly in recent years. If this was due to real progress in conserving vital forces all along the lines of life (age, condition, race, etc.), we could rejoice greatly and congratulate ourselves on a definite gain over past ages. Unfortunately this is not proven,—despite our vaunted medical progress, faithfully and conscientiously studied as it is,—but Dr. John S. Billings (in his lecture on "Vital Statistics," 1889) concludes that this increase in the expectation of life is only true of the earlier ages, and because more persons of feeble constitution are now nursed to manhood. The decrease in mortality is due chiefly to the better care of infants and the prevention of contagious diseases.

CARE AND MANAGEMENT.

Treatment.—The upbuilding and repair of weakly children should be considered on broad principles, the basis of which is elaborate thoroughness

and abundance of time. It involves special attention to dietetics, including a critical estimation of varying states and capacities of digestion, all the ordinary hygienic measures and the hopeful use of some drugs. There must be insisted on for such, during both average health and during illness and convalescence, more rest for the mind and body than is necessary for the average child. All outings and exercises, both active and passive, should be supplemented by rest lying down for as long a time, it may be minute for minute, as the active periods. This rest is necessary to enable lowered organic processes to regain their customary tone, and especially to secure definite gains. It will often be necessary to precede food by a period of rest, to enable the digestive activities to do their work; otherwise, the highly sensitive nervous distribution to the digestive apparatus will fail of its full energizing. Agitation impairs the even flow of the circulation so necessary for weakened organs, particularly the brain, whence governing impulses perpetually flow, dominating the body and spirit. Therefore, too, the emotions must in the weakly be not only kept well under control, but subjected to the least possible disturbance or exaltation. The temperaments (or mental attitudes from which they view life) of all children require steady and patient training. Even in the home a clear recognition of these is needed. In the case of strong children equipped with clear, dominant, healthy minds, it is undoubtedly true that fair results come somehow from very diverse and ill-directed influences; but for the weaker ones impressionable or apathetic, thorough conscientious study and specially directed measures are required.

For such little folk it is not enough to prescribe suitable medicines and enumerate casually a lot of easily-digested foods which the mother shall provide, nor to direct proper bathings, outings, and other general measures. A thorough systematization of the entire daily life of the child is infinitely more efficacious than the most accurately-selected medicines or the use of that innumerable host of children's foods which, in the form of specious descriptive circulars the enterprising chemists flood our morning mails. The best tonic for the stomach is food carefully prepared, such as a fairly intelligent mother in even the humblest walks of life, if rightly directed, can readily afford, but always provided that the times and circumstances of the administration be wisely chosen and rigidly adhered to.

Predigestion of food-stuffs offers undeniable safeguards to the weakened, toneless digestive tract, but robs the pabulum too often of that savoriness which is essential to acceptability, and hence imperils appetite.

While exercising care as to the quality and preparation of foods for weakly or convalescent children, it is imperative to bear in mind the need for suitable variety. This fact I have time and again verified. A child will be presented who is fed with the utmost care and regularity, oftentimes under the best of medical advice, and yet its progress comes to a standstill, or it is seen to obviously lose. Upon inquiry there will be revealed much sameness in the diet list, otherwise properly adjusted to the condition

for which it was originally outlined. The little victim's soul comes to loathe and abhor the sight of flabby paps, occurring in dismal routine, or the same old, wearying round of bread, meat, and a dab of vegetables. If to these are now added a more varied dietary, revising the menu day by day, even lapsing into a taste, now and again, of articles ordinarily denied yet savory and tempting, great progress will soon be obvious.

The growing practice of sterilizing milk for infants and children, invaluable as this protection is for temporary use during hot weather in cities, often leaves anæmia and tonelessness in its train if its use be persisted in. There is a value in the vital properties of fresh milk not to be produced or retained by any artificial process.

The utmost care needs to be observed, however: first, in the quality of the milk, which includes an estimation of the health of the cow; secondly, strict regulation as to the treatment of the milk while being gathered and immediately thereafter, and, finally, the greatest conscientiousness in securing cleanliness of the containing vessels. These conditions, though difficult, are becoming more and more possible as knowledge grows, and if fulfilled will bring a perfect article to the consumer.

The points which certainly do not obtain adequate general attention are the thorough systematization of the when, where, and how much of these foods shall be taken; what *varieties* shall be insisted upon; the times, kind, and suitability of bath, the amount and character of exercise, and, above all, definite periods of *rest* before and after feeding, so that the organs shall be able to act deliberately. First, then, when confronted with an ailing child, one who is not ill, but far from well; when appetite is variable but small, when sleep is restless, the digestive organs manifestly disturbed and temper fretful, one that fails to hold its own in play among its fellows, and, what may not be ignored, whose weekly school report shows decided backsliding; first, I say, look the little fellow over thoroughly and in all respects.

There may not be one organ more amiss than another, though the most obvious faults will usually be seen in that avenue to all vital power, the *prima via*. There may be yet no falling off in weight, a far more instructive index in a child than in an adult, nor an obvious anæmia. There may be a quicker pulse than ordinarily, a change in the heart-sounds which the initiated will recognize but cannot so clearly describe; there probably will be found, if so much trouble be taken, a rise in temperature, slight but unmistakable at times, at others subnormality well marked, and there is great probability that neither the attention nor other exertion is readily sustained. The child, in marked contrast to its healthy comrades and itself at other times, is willing to sit aimlessly, if not a martyr to energetic taskmasters, or to an over-strenuous conscience which drives its willing victim to the verge of perpetual exhaustion, and often over it into the pit of complete collapse.

Such cases as here pictured are common enough, if only the eyes are open to see them. They escape attention only too readily till some malady

seizes them in all their pitiable weakness, and life is speedily quenched. It is a worthy quest, then, to seek out and rescue these from, it may be no picturesque fate, but an ever-present menace; to rehabilitate these unresilient little bodies, and even make them better than before; to put them in the way of a sound bodily equipment for their life-work anon.

Here is a little sketch of a sort of modified rest treatment which produces excellent results when all other efforts have failed to start a child along the line of progress. Put the little one in bed and keep him there from a few days to a week or more, and write down distinctly for the mother a strict schedule giving the exact hours for feeding. These may be the ordinary three meals with some little fluid food taken in between whiles, or better, direct four meals to be given in the day, at, say, seven, twelve, four, and eight o'clock, the largest meal at noon. Omit the tonics hitherto given and add digestive ferments, or malt, or both. Let the day begin with a sponge-bath in a warm room, then a light breakfast daintily served. In the early afternoon let some one rub into the trunk and limbs an oil; olive oil is very nice and much of it is thus absorbed; cod-liver oil is better, and not disagreeable if free from rancidity and one-third part soap liniment is added, which probably aids the osmotic action. This serves as a form of passive exercise and also a nutriment, or at least a tonic to the skin, circulation, and surface nerves. The surface should be thoroughly wiped off afterwards, that no foulness remain. I have seen children immensely benefited, even among the poorest dispensary cases, from this one measure alone. Above all, in the early course of these measures, if the child manifest a desire for toys they may be allowed sparingly, but aggressive entertainment by over-officious persons is a harm and an offence and should be strictly forbidden. After a few days or a week the range of one sunny room may be permitted, but still the child should be let alone, and in most cases it will be happy and amuse itself.

Frail children require systematic development of their various organs, as well as of their muscles. To be sure, it seems scarcely practicable to develop some organs, as a stomach or a kidney; nevertheless, it is possible to do so. It is abundantly obvious that the eye and the skin can be developed, and it is equally important that all these organs should receive attention in the aggregate and separately, especially where there is a manifest under-development of the one or the other, which then should receive specific attention.

To take first the eye,—an infant can sustain very considerable damage to its eye by objectionable exposure to light, which may be too strong, or too sudden, or too constant. It may readily have its eye-muscles disturbed by an habitual attitude, as when, by reason of a weak back or other disability, it is confined to a single place, as a chair, in a customary situation in the same room, straining vision in one way, and many other objectionable practices which common sense and observation will make evident. By the same token, this eye or pair of eyes may become developed, not only in

its organic capacities, in the judging of distance, inviting refractive adjustments, etc.; but, as intelligence increases, great good can be accomplished by a thoughtful use of interesting objects which may excite the child's wholesome interest and educate its perception.

There are experiments now afoot, that at least promise well, by which children can be taught so to perceive differences of color, in form, and the arrangement of objects, as will greatly facilitate their comprehension of natural phenomena. It is quite possible that along this line may be found means to prevent defects of sight, such as color-blindness, as well as to check the progress of myopia and other refractive errors.

One practical point suggests itself here, and that is, the great unwisdom of submitting babies to rapid journeys, the looking out of windows at swiftly-passing objects while flying along. We have seen migraine apparently develop through the custom of giving a couple of small children long exercise in a carriage with a pair of fast horses every day. We have certainly seen instances of profound disturbance caused by this means, and it is reasonable to infer that a continuance of such like objectionable measures may produce lasting damage upon so delicate an organ as the eye, and the whole sensitive organism thus is imperilled.

The custom of encouraging a child to sleep while being driven about is unwise. The motion is both regular and subject to sudden irregularities. The persistence of one kind of motion up and down is bad, not only producing relatively unsound sleep, but keeping up a molecular agitation throughout, which has little to recommend it. If the infant be awake and sufficiently old and alert to sit up and look about, or to be forcibly held by the nurse in an upright position, a strain is put upon the spinal column. Thus, continuous mild concussions are administered to the spinal cord and brain, thus the eye is put upon the strain, reacting directly upon the brain; an element of excitement is introduced and physiological irritability is a probable result.

The development of the skin is of paramount importance in the young, as upon its capacity to endure changes in temperature and other states will depend much of the future healthfulness of the individual. Some children have the layers of the skin unformed from the first, and it never acquires normal activity. There is quite a large variety of skins obviously different to the observant persons,—the firm, glossy, or velvety skin of health, the pallid, flabby or leaky skin, readily becoming over-moist, loosely attached and wrinkling readily, or the yellow, harsh skin, either flabby and toneless, or stiff and inelastic, adhering to the bone, or seeming to do so. Some skins are insensitive and react to almost no stimulant; others chafe and get out of order if only thin clothing press upon them, hypersensitive to all agencies.

The skin of a red-haired child is always tender and usually beautiful. Children predisposed to tuberculosis or scrofulosis have poor skins, which can be and should be immediately improved. Various neuroses show in

the skin. In short, the surface of the body is of vast activity, and the cultivation of this large part of the organism is of critical importance.

Now, as to the means of improvement in our control. I believe if babies were anointed with oil from the first, and cleansed by rubbing them off, not using water, or but sparingly, for weeks or months, their skins would become more vigorous than when soap and water are freely used. This I have proved by a series of cases observed (and published), three of whom were my own offspring. Exposure of the skins of infants to the air of an equally heated room is wholesome, and they are better for as much exposure as possible, always short of chills. In America we are subject to such sudden and extreme changes that we dare not allow this as freely as is safe in many other countries. The exposure of knees and shoulders in children not the most robust is dangerous unless carefully watched and promptly covered at the approach of chilling conditions. In-doors it is of use, out-doors not to be recommended to all. To go barefoot is wholesome for many. Almost never do children hurt their feet, and thus only are the feet symmetrically developed. They do not increase in size seriously. I know of numbers of Southern girls with feet entirely beautiful who ran barefoot in warm weather until they were almost grown.

Cautious exposures can induce a tolerance of skin and feet exposure which will greatly strengthen the whole organism and should be encouraged. The clothing at no time should be one bit more than necessary to protect. Over-swathing lessens energy to a most surprising extent; it throws the volatile elements of excretion back into the blood and directly poisons. The skin should be able to throw entirely and promptly away its effluvia, which should be suffered free escape or it will damage the lungs or kidneys. When we bear in mind the capacity of the surface blood-vessels, and how greatly the vascular dilatation or contraction alters the state of the varying blood-supply to internal organs, also how large is the amount of matter excreted by the skin and many other points involved in its functional activities, we at once recognize the importance of preserving its integrity at all times. If these activities are anatomically undeveloped or functionally impaired they demand our best attention. Natural means are best, judiciously controlled. Exposure is important, always with caution. Bathing should be frequent, daily, indeed, or in hot weather, oftener, in as cool water as can be enjoyed or well endured, but gradually if unaccustomed. Bathing should be followed by thorough drying and rubbing, and prompt covering; weakly folk should lie down awhile after. If chilled let them get into bed for a time till complete reaction comes or fatigue goes. When bathing cannot be so well endured, at least so often as may be indicated, then a dry rub will suffice, especially after exertion and opening of the pores. If all this tires the child it should lie down, and the work be done by another person. Soaps are to be used sparingly and only for cleansing. Salt is almost as cleansing and more stimulating. If the skin is tender, bran decoctions added to the bath will soothe. Ammonia or sulphur added

to the water has value, rendering it soft and exerting special effects. To begin cold bathing, let one unaccustomed stand in three inches of warm water and be sponged off in cool and cooler water. The custom of the Greeks to exercise naked anointed with oils has much to commend it. The rolling in the sand of the arena in wrestling was accredited with benefit and no doubt rightly. Wading at the sea-shore and digging in the sand is analogous, and much to be commended if not too prolonged. Swimming comes next to bathing, and is among the finest agencies for invigoration of skin and muscles. Remaining long in the water, above half an hour, is of doubtful value, and over an hour is a strain, and for several hours is hurtful to any but the strongest, and does them no good. Water colder than the air of the bath-room is often hurtful for the strongest and of little or no value to any. Shower-baths and needle-baths are terrifying to most children, and possess no advantage over sponging or plunging. It is best for little folk to encourage cool bathing by gentle graduations and to make of it a reward or frolic.

The exercise of the lungs next to the skin requires much attention. First, it is necessary to make sure that the avenues to the lungs, the nose, and throat shall be clean and healthy. Upon proper lung action depends the aëration of the blood, and through these the complete activity of the remotest organ. Upon the integrity of the epithelium of the respiratory passages depends in great measure the defence of the organism against the onslaughts of many microbic poisons.

The nose and naso-pharynx must be kept free of irritations and pathologic changes, which may limit function or obstruct the in-and-out go of the air. Upon the competence of the lung-expansion will depend the completeness of oxygenation and the integrity of especially those portions of the lung which are less liable to a full distention, as the apices, so rarely developed and so vulnerable, and also the lower borders. The development of the lungs, of course, is more commonly obtained through normal activities, but if for any reason these are impaired, as, for instance, lameness, an enfeebled or damaged heart, or a weak, nervous organization, and the child be not able, or it may be unwilling, or, at least, indisposed to wholesome action and exercises, then it is essential not to lose sight of the necessity of getting these lungs sufficiently dilated for their proper growth and the continuance of their integrity. For feeble children it is convenient to induce them to play at certain games which may involve deep respirations and forcible blowings. Indeed, one of the first accomplishments to teach a child is to blow its nose properly. Pretty much every child in America inherits or may develop a condition of pharyngeal catarrh. To be sure, among the Greeks, it was considered a degradation to be obliged to blow the nose, and a most impolite thing to do, but the reason for that was their perfect health, and a large part of this was the magnificent attention their skins received throughout their earlier and later years.

Our children will almost inevitably acquire occasional catarrhs, and

they should be early taught to free the nose of this secretion. The way to do this is to teach them to blow a long, steady blast, holding the handkerchief against one nostril the while, and then holding the opposite nostril, to take a long inspiration, and then to blow steadily out of the other one. And then, if not free, to repeat this process on alternate sides, at least twice. Then the air comes and goes freely, as it should, to the lungs, suitably warmed and screened.

Hearing, also, needs attention in the same way. As is well known, those children who habitually hear good music have this sense-perception well developed. The sense of smell, while deserving of attention, is rather more likely to be over-developed to the point of squeamishness than to suffer any lack in this direction, seeing that in the evolution of the race the nose has clearly less need of development than in the savage state.

In the matter of taste this merely need be alluded to, but might be discussed to a very interesting length.

CAUSES OF FEEBLENESS.

The causes of feebleness are of wide variety and not to be clearly differentiated always, many times overlapping. They may be divided, for the purposes of clinical study, into those which are (1) inherited, (2) intrinsic or essential causes, (3) developmental, (4) acquired. The inherited causes of weakness are rather those of predisposition, "a type of tissue soil," an attitude of trophic energy, a tendency to this or that condition, active or passive, in which there is an element of remote or near heredity. And here also come in racial characteristics, the peculiarities produced in races by living in certain narrow conditions, it may be, of deprivation or moulding environment, lessening the powers of resistance. This is commonly seen in localities where the people have lived under certain similar conditions for a number of generations, or where salient characteristics show themselves throughout a family strain.

Such cases as these are being continually modified by changed circumstances, and are studied with more divergence of conclusion than most other things. The views of some of those who write upon heredity are sometimes wrong, at other times silly, and rarely of much practical value. This matter will be touched upon under predisposition. Intrinsic causes of weakness are also to be called essential; or, we might make use of the ancient medical term "idiopathic," still a respectable cloak for our ignorance. There are numbers of children in whom we find marked lack of vigor, a miserable capacity to react against depressing causes, and in whom a very careful search fails to reveal any recognizable or rational ground for their feebleness. Such a child may be one of a family otherwise vigorous enough, in whom there is no good ground for accusing heredity or collateral conditions. Moreover, while it is readily possible to put one's finger upon the few apparently adequate causes having to do with the early upbringing, nevertheless, upon equally careful search in the records of some of the children

of the same parents, a very similar history may be obtained. So, as a matter of fact, there is no rule of guidance to be elicited; the child simply is not strong. All we can do is to recognize that such children as these are deficient in vigor and take the necessary precautions for repair and for development.

It has seemed to me that a likely cause for this condition will be found most times in a lowered state of vitality in the parents, especially in the mother immediately preceding birth or during gestation. Therefore this might be called prenatal. Children of an aged father, even though by a vigorous mother, are almost always frail; also the offspring of a mother in the late-bearing periods. But not much is to be gained by a variety of terms, all more or less conjectural and descriptive, but entirely irremovable, and it is better to be content to recognize isolated cases of weakly children when we see them and to set ourselves sedulously searching for remedies rather than classifications.

Next comes the subject of developmental causes, which oftentimes are forcefully operative in producing a wretched child, who might readily have been a fine, vigorous person if rightfully handled. This is a very important subject and warrants a fuller consideration than the others, for many reasons, chiefly, however, because such cases are susceptible of large improvement as we meet them; but if we could have gotten hold of them earlier, or had they been soon enough recognized, this gain might have been made most satisfactory. There is too much reliance in the mind of the average practitioner on the abundant powers of nature acting with the accidental environment of the child. Children are left much to their own devices to grow as they may, and this is safe enough if only they happen to be primarily well endowed with initial vigor, and if the accidents of their surroundings and influences are, and continue to be, wholesome. By no means should we interfere with the normal processes of healthy, natural tendencies; spontaneity should be always encouraged. The best human beings come from healthy, humble households, more often found in the country or in villages, where domestic methods are simpler and the exciting or complicating factors are fewest. It may be assumed that in the cities not only are the perils which beset the infant far more numerous, but the opportunities for right development are less, and need especially the watchful care of parent and teacher, and, above all, the skilful supervision of the medical adviser. Civilization may not be the boon we delight in regarding it, for undoubtedly the highest products of civilization are not, as a rule, the best equipped with working powers of body or mind, and it is beyond peradventure that in the more crowded cities with all their improved sanitary conditions the most pitiable instances of degenerate humanity are found.

Here, then, is need for our best endeavors to bring out and improve the latent possibilities of the future bread-winners and propagators of the race. Not that all virtue resides in country air, or that to the city child an inevitable blight continually threatens; but human beings can only be expected to develop in proportion to the two factors,—one the primal

capacities, the other opportunity. Moreover, whereas water may be induced by much skilful modification of the laws of nature to rise higher than its source, its normal course is to fall along the lines of least resistance, to go where it may, and to take its color from the soil over which it flows. And so with all of us from the cradle to the grave, we strike our level soon or late. And if peradventure some attain to great bodily or mental eminence, it is mostly through good help enjoyed, or at least by escaping hurtful opposition. Considering, then, the developmental needs of the child from the physical stand-point, we may divide the subject thus: Of a normal child, as we may assume him to be usually found, equipped with a good foundation of bodily integrity and original competence, there is much that may be said concerning opportunity and encouragement through various developmental epochs as a babe, infant, child, youth. And these again are somewhat modified, especially in later years, by the differences of sex. It should be recognized, too, that those on different planes of life require different kinds of advice and privileges. Especially is this true of those confined to the pernicious wastes of brick and stone, of alleys and gutters in our large cities during the none too blessed summer. Even a day in the country now and then is a godsend to them.

I cannot refrain from saying just a word as to the imperative need of effort we all, every citizen, should make to maintain and enlarge our open spaces and play-grounds, our river fronts, our public gardens, to establish roof gardens especially, and every means by which the city child shall be aided in conserving its much imperilled health and widening the possibilities for reasonable growth. The power to do this should stand in direct relations to the school boards, and those of the educational offices hold a rare privilege and grave responsibilities in their hands which we must see that they use aright. The very dearest and healthiest enjoyments of a boy's life are connected with forms of warlike sports, some mimic strife or game of hunting, and unless opportunity be given to work out these wholesome and legitimate tendencies on a bit of open ground, the forces become explosive, revolutionary; therefore mischief and destruction or absolute viciousness ensues, to the hurt of the community (which, being abundantly policed, may be able to stand it), or worse, to the child itself, whose nature is thus embittered, and the outcome is disease not only of body but of character and morals. The child who begins life without a fair start, handicapped by some form of developmental shortcoming, if through the public fault, acquires a right to demand of the State thorough and skilful investigation. Medical men, teachers, and philanthropists habitually assume that the child is a perfect piece of humanity, which merely requires moderate opportunities and encouragement to develop. They need much more of skilful guidance if they possess the average parent, who is, as a rule, too busy and too unwise to direct them intelligently in physical and mental habits. Home teaching and influences are theoretically best, but they can in most instances be enormously bettered, and the way to do this is to call the

parents' attention to their responsibility and give them a few sound rules of guidance. Better, still, teach by example, and we should all strive to interest our children by our companionship, our intimacy.

The acquired causes of frailty in children are too extensive for me to attempt to enumerate and classify, and have to do, rather, with the whole subject of infantile disease and those effects which are not fully recovered from. The healthy organism throws off acute disease, and little or nothing will remain unless some organ or tissue be inflamed a little more than its power for repair, and this remains either damaged or over-susceptible to other morbific agents. There is much force in the arguments of those who assert that all disease has at its base the element of fatigue, and at some future time I hope to present my observations on this subject more thoroughly. During the process of development there are many periods wherein symmetrical growth is more readily disturbed and the effects of fatigue made manifest. Prolonged tension tends to kill, not only growth, but that which should accompany growth,—namely, joy. Adequate rest, as has been alluded to many times in this paper, is not only an important but a complex subject, requiring careful study and attention. Direct results of fatigue have been shown to produce temporary color-blindness, loss of memory, and slowing of reaction times. It is quite within the experience of any careful observer of children that it may produce a great many other effects, ephemeral, temporary, and permanent. The working with dulled minds produces bad mental habits. Functional activities in a growing organism subject to strains unduly severe and prolonged inevitably result in disordered and probably diseased organs. Then, again, there are numberless causes which increase latent susceptibilities, or create them, and conspicuously lessen resistance to infective agents. The much-talked-of sewer-gas works rather in the way of increasing the susceptibility to diphtheria, typhoid fever, and other filth diseases, than as a direct agency in their spread. In so specific a disorder as rickets, thoroughly good opportunities may altogether overcome even a well-marked inherited taint, and, on the contrary, a perfectly healthy baby may develop a type of tissue soil which will result in rachitic feebleness.

Predisposition.—Each and all of us are exposed to forms of infection, poisons and devitalizing circumstances the defence against which is a relative degree of inherent immunity.

Predisposition is that condition of the body in which causes that leave other persons unaffected call forth an attack of disease in one who is predisposed. Predisposition may be inherited or acquired, and is used generally to signify susceptibility to the infectious diseases by which the parts and forces of the body lose their defence against the invasions of pathogenic organisms. Immunity, on the contrary, is that state or condition of the body, its parts or its forces by reason of which it is able to resist the development of morbid or infectious processes. These may be divided into natural, acquired, and artificial.

This question of predisposition and immunity is receiving a deal of attention at the hands of investigators nowadays, and most valuable studies are in progress in laboratories the world over. With the special studies of these we cannot here now deal, but it is one of the most important of the fundamental items of medical knowledge. It is well established that individuals vary exceedingly as to the degree of their predisposition to disease as well as to the variety of agents to which they are susceptible. Not only so, but this variation involves seasons, times of growth, and various conditions. A great many microbic poisons, or the causes which produce these, are present not only in the environment of most people, but are to be constantly found in the normal secretions of the mouth and respiratory tract. This is especially true of pneumococcus of Friedlander and the staphylococci. Others are more or less constantly found, many of less gravity, but even the deadly tubercle bacillus is round and about us at all times in any ordinary community, and may frequently be found not only under foot but in the air all about us, and actually laid away in the cavities of our body ready to infect it upon occasion.

The proportion of persons predisposed to infectious diseases varies, as has been said, in some periods being almost universal, while in others, limited. Epidemics can be explained by the varying equation due to predisposition and infective power of infective agents. Children frequently escape infection which attacks others all about them with precisely the same environment, and may pass through an epidemic unscathed. Nor is it true that we can always or, indeed, often predict who is and who is not thus susceptible. The most robust fall ready victims under certain conditions,—the feeble ones then resisting well. A little later this may be reversed, and the feeble ones are attacked.

As our knowledge grows we may be able to learn what are the factors that enter into these equations, and how we may be able to predicate one or the other. And, indeed, the present outlook is most hopeful for practical results. Koch suggests three specific causes of tuberculosis: first, destroyed or damaged ciliated epithelium; second, denudation of the protecting epithelium of the bronchi; third, deformities of the thorax and adhesions of the lungs, hindering full expansion and rendering them liable to retain secretions holding infectious matter in suspension. And yet these by no means explain susceptibility. There must be some essential change in the cells and juices of the body: anatomical, structural, blood-supply, lymph-supply, and the like; disturbed states of the leucocytes, the integrity of the phagocytes, and the blood and blood serum.

There are also admitted to be "places of less resistance." Certain of the organs and tissues differ in their local cell weaknesses, as the throat is more susceptible to the poison of diphtheria, and they also differ in their resistive and destructive powers with regard to the microbes, and again to the anatomical and *temporary variations in* structure and also chemical differences.

Again, in addition to the barriers which nature has set up to the entrance

of these destructive microbes, common conditions in the blood itself might be considered, but their discussion would carry us too far afield. The microbes themselves require a critical estimation as to their numbers, their varying states of virulence, and whether these—although of the same kind —are pathogenic or non-pathogenic microbes. The chief defence against the onslaught of germs is to destroy predisposition. How this can be done is not yet clear, but it lies presumably through maintaining perfection in the tissues and especially in the blood integrity.

FORMS OF EXERCISES AND OUTINGS.

Every element of excitement, not forgetting over-solicitous attention and forced amusements, should be deprecated and avoided until the child acquires genuine vigor. Excitable children need to be watched with the utmost care, and the element of strain wherever detected should be sedulously removed. For very young babies merely keeping them in the open air is of great value. They should be sufficiently clothed, but not suffocated. The rule should be just enough and of the right kind, but not one bit too much; reserve overclothing to be near at hand always. In bitter cold weather veils are of great impotance, always of sufficiently open mesh for the air to get readily through, but to protect from the wind. This, upon occasion, may be doubled, and had better be of dark color and natural tint. For the poor, a piece of cheese-cloth will suffice. Veils should be washed or at least cleansed frequently, as a great deal of objectionable matter, both from the expired air and from floating dust, may accumulate upon them and be inbreathed again.

There is a prejudice against a baby or a child sleeping in the open air. If, however, it be sufficiently wrapped up no harm can result. During sleep relaxation occurs, especially with children of tender, leaky skins, and surface chills may arise, but this need not be if precautions are used. A valuable form of exercise and an adequate outing is had from allowing a little child from three to five years old to play about in a room with the windows wide open, and with its usual extra clothing on such as is worn when taking its ordinary walks abroad. This form of outing can be enjoyed anywhere, at any time, for any given length of time, and the perfection with which it may be controlled is of the greatest advantage. Furthermore, by these means the care-taker watching may remain with the child and utilize the time by pursuing some employment in useful fashion the while. An apathetic little one, who without constant urging will quietly sit down and do nothing, may be kept busy or amused; and, *per contra*, a rushing, bustling little one, who would readily overdo, may be thus held in check.

Children of weak lungs or insufficient lung-expansion or with a predisposition to phthisis may be taught regulated breathings to great advantage. Also, a useful measure is to institute for these some games, such as blowing through a tube, as shooting of peas through a tube at a mark,—a

very practical means of increasing thoracic size and lung-power. An excellent in-door game is the old-fashioned bean-bag, at which the nurse can be a companion, and thus a perfect regulation can be established of the amount of energies employed. This bag of beans may be tossed back and forth so many times, increasing it from day to day and week by week. It may be at increasing distances. Both hands may at first be used, and by and by, as strength grows, the one hand or the other, not neglecting each. Both the right hand and the left may have their adequate employment, and even for stronger children this is of excellent utility.

The next step in this direction is the use of the medicine ball, which in our larger gymnasia has become quite the fashion. This so-called "medicine ball" is merely a sphere, made up of soft material, weighing from one to six or seven pounds, and covered with soft leather, the rough surface out. For little children it may be about the size of an orange, or preferably a little bigger, as being convenient to hold in two hands. This, passed or tossed from one to another, requires more skill than the bean-bag, and may be used in the same way that a foot-ball is thrown and caught, either with two hands or one hand, and soon a very large measure of skill is acquired and interest incited. When the regulation or prescribed amount of passing has been done, then it can be stopped for one or all the players. A watchful care-taker may learn this himself or herself, or act under specific instruction what to do and what not to do.

The most important element in all games is the incentive of competition, even if that competition be with one's own self. In all these exercises, which are devised for the purpose of keeping up a consistent interest, a much larger amount of activity may be used, and with less reactionary fatigue, than with any form of exercise which fails of this, no matter how eagerly one may pursue it as a measure. The converse point is, however, that vivid interest may cause a weakly person to do too much, even where he is endeavoring to do something with skill in which he himself is the only competitor. When, however, the competition is with others, the element of excitement is added, which may become hurtful to those insufficiently strong. Of games, many of the larger competitive kinds are manifestly unfit for children not overly strong. Match games of foot-ball, or even base-ball, are out of the question. Milder competitions, as in shinny or rowing, are of doubtful value; but golf is a perfect game for the feeble and the strong, the young and the old of either sex.

The evidences of over-exercise in children or in weakly persons generally must be carefully rated. Mere breathlessness is no objection, and is easily recovered from if the organs be sound. Also, a pretty free sweating is harmless enough unless this goes to the point of saturating the underclothes, exposing one to secondary chill. If, however, with very small exertion sweating comes readily, and, instead of being accompanied by a normal reddening of the surface and the face, the person becomes pallid or bluish and loses the normal lustre or brightness of the eye, then caution

must be observed. If after small exertion is seen a sort of trembling of the limbs, of the face and lips, this means that enough has then been done, and possibly too much. If seen habitually in the same individual, the amount of exercise must be limited until by slow degrees and other means adequate strength is acquired. Much soreness in the muscles afterwards is of no gravity, though often a source of anxiety.

It is a good point to note the face to be ruddy, pallid, or bluish, as an indication of benefit or harm from exercise; not that it is infallible, because some of the powerful athletes, men of greatest endurance, become pale while in action. This is, however, unusual. The pulse is a useful indicator too, and while, of course, even the most vigorous people who are in moderate condition have their heart-action immensely accelerated under sustained exertion, nevertheless this usually marks the limit of their capacity, and must not be kept up too long under sustained exertion, and if the person be in good condition, he is likely to have a full, strong pulse, only a little quickened over his ordinary state.

I once made comparison between four men climbing a high and very rough mountain, while on a hunting expedition. We were all in good condition, and one of us was an Indian boy of eighteen, rather slender, and not especially robust-looking. We all had loads upon our backs, but this boy had the heaviest, not less than seventy pounds. When, after a continued rise of over two hours, we reached the top of a certain eminence, I quickly counted the pulse of all present. And this boy was the coolest of the lot, and his pulse-rate was only a little over seventy, whereas the rest of us very nearly doubled that. When sitting quietly around the camp-fire his pulse and mine were just the same.

On another occasion, on a very hot day in summer, I compared my own son's pulse with mine, he being in perfect condition and thirteen years of age, and I as strong as most men, but unable to maintain constantly that happy state, at the time perfectly well, though not in fit condition. After having reached afoot the top of a mountain about fifteen hundred feet in height, his pulse-rate was only a little more than half of mine.

I have repeatedly examined the pulse and heart of boys under varying strains, such as a long foot-ball game or base-ball match, in which there was pretty constant action, and have noted that the condition of the pulse in those otherwise in equal condition varied very much with their excitability. And, inasmuch as this excitability of the person reflected upon the pulse means rapid using up of pabulum and rapid oxidization, therefore it is fair to assume that the rapidity of the pulse is a good indication of the using up of vigor. If the strain on the heart is too severe the result will be a proportionate exhaustion. The tissues of young folk are so clean an elastic intravascular pressure can do less harm than in the adults. The heart not only needs to be of proper size, shape, and tissue competence to fit the body, but the quality of its vein supply may be ample or lacking; when this is below par the heart acts slowly and laboriously, and is easily

wearied and its force soon spent. This is shown in dyspnœa and palpitation, "air hunger," "besoin de respirer," if long continued the result is cardiac asthma. This phenomenon is frequently observed in the healthy under customary exertion; it is then chiefly due to the normal phenomena of insufficient elimination of the products of tissue waste, and is comfortably met by a few minutes deep breathing or ample oxygenation, and most economically lying flat on the back, arms and legs outstretched, the head retracted and mouth open.

For (young or older) children the very best form of outing is to potter about a large garden, doing a little here and there and then resting awhile. The acts involved in gardening, the digging and pruning and various forms of activity essential thereto, are far and away the healthiest forms of exertion known to man. Indeed, the age of gardeners is unusually prolonged, provided they live wholesomely conditioned lives otherwise. Farm work is a different matter, involving greater strains. But the work of the garden, under intelligent supervision (or advice which is followed), is suitable for young or old, and is of the largest possible utility.

For girls or feebler boys the cultivation of flowers in boxes, or window gardening, is a healthful occupation. The care of small animals or of fish, as of birds or small four-legged pets, the making and caring for aquaria and such like things, are excellent, as sustaining interest and supplying some form of activity and variety without strain. The study of botany and field botanizing is among the best, on which I should be glad to dwell at length.

The study of birds in their natural haunts, watching their conduct, listening to and recording their songs, keeping the eyes upon their movements, especially with a field-glass, is of infinite interest. So, also, of the woodland moving things, not neglecting even ants and spiders, although using all due precautions in approaching the latter.

For older boys, even of the sickliest, provided they have the use of their limbs and reasonable integrity of their organs, there is no one form of life which so largely conduces to the building up of nervous force and muscular vigor as camping out in the woods. There is so much to be said on this subject, right sort of camp protection and varying conditions, that it is impossible to do more than allude to it with the statement that my experience has been fairly large, admitting of an expression of opinion, though few rules can be formulated short of a long essay.

The life of a boy under, of course, proper control in the woods far away from civilization is as near as possible to perfection, to aboriginal nature. He is freest there from all those minor and major disturbing influences, excitements, artificial restrictions on spontaneity which permits of healthy growth, mental and physical, encourages symmetry and fortifies against warpings.

I have seen a boy not ill, but still far from strong, about whom it was most natural to be gravely apprehensive lest the experiment should fail or

prove disastrous; nevertheless, without himself being particularly pleased with the experience, this camp-life succeeded in accomplishing what no other combinations had been able to do, even of the most carefully-selected or expensive kind. The irregularity of the feeding, the lack of sleeping comforts, the loss of various civilized necessities notwithstanding, were offset with immense effect by the simplicity of the life, the element of independence of little things ordinarily provided and thought to be needful, the absolute naturalness of the motions and attitudes, and things done, the early hours to bed, and the even earlier to rise, the constant breathing of perfect air, whether this be night or day or wet or dry, it mattered not, and many other points too numerous to mention, produced a condition which when in doubt it is always well to hopefully attempt.

Morals and religion in these surroundings need little teaching,—a hint will suffice, and this, to the narrowed mental horizon of a young person, is a vastly important point,—and nowhere better than in the woods or wilds. Confusion is usually produced in the concepts, and is a much worse thing than ignorance which is a clear field for the understanding.

DEVELOPMENT OF MUSCLES.

There is still an impression prevailing among even the best teachers of physical culture that the development of the muscles has of itself a particularly valuable influence upon the general constitutional vigor. A good deal of attention is directed by writers on this subject to various means of cultivating muscular power. This is true only to a very moderate extent. To be sure, the exercising of the muscles can scarcely be carried on independently of certain collateral co-ordinative acts involving the vital organs. By quickening their activity by that of the circulation and stimulating the ebb and flow of the blood throughout the motor mechanism, this does improve nutrition, and, to a certain degree, enhances generally the activity and power of the body. Exercising the muscles in vigorous persons with sound and competent organs adds to the usefulness of the trunk and limbs, enlarges their capacities, and is of permanent value. In the class of cases under discussion this is also true, but with many important modifications.

Let us review for a moment the different kinds of muscular actions, their mechanism, and their physiology. There are the voluntary and the involuntary muscles; ordinarily only the former are considered under the subject of exercise. The effect upon the involuntary muscles is a very important one, however, and precedes and should proceed *pari passu* with the stimulation of the voluntary mechanism. It is conceivable, and, indeed, I have seen instances which illustrated this, where individuals have acquired a species of muscular monstrosity by having their voluntary muscles so exercised as to increase their size and power out of all proportion to the organic capacity of the individual. This produces an overgrowth of a

kind that is not only almost valueless, but a distinct menace and an evil example. In the exercise of the limbs we may divide the kind of energy into those of swiftness or speed and power, which may be again divided into the combination of both swiftness and power. In acts of muscular swiftness we have a very intimate connection between the motor centre and mechanism in which the centre is more exercised than the limbs in proportion as we try to produce accuracy of movement. In any muscular action involving mere power, as, for example, lifting a dead weight, there is very little effect produced upon the motor centre, but the strain is directly upon the muscle used, collateral muscles acting with this, the tendons and framework, and particularly the heart and peripheral vessels. In acts which involve both force and swiftness along with accuracy, there is a large complexity in the physiological act and the most wide-spread strain upon the mechanism, as, for instance, rowing a boat as rapidly and as long as possible. There is again another form of muscular activity which involves a very considerable strain, but which is too often overlooked, and that is the physical tension illustrated by the perfect muscular equipoise of a cat lying in wait for a mouse, in which almost every muscle of the body is used, controlling the nervous mechanism including the brain, which here is in a form of concentrated tension. This latent energy produces very considerable fatigue, and directly in proportion to the degree of excitement and concentration of attention. It is familiar to all, and most of us can appreciate how fatiguing it is to stand for a long time, or to hold on to an object, as even a baby in the arms, the tiller of a boat, or the reins while driving a horse. The strain is doubled by an excitement which may again be greatly exaggerated to the hypersensitive or over-conscientious person in the performance or continuance of an act. It is not so familiar, perhaps, but equally important to realize and prevent that sort of fatigue which is liable to occur in those who must remain quiet, but who excite themselves by carrying out conspicuous acts of another in their minds while watching them. For instance, an excitable person looking at a match game of foot-ball, influenced by eagerness for the success of one side, involuntarily puts forth an immense degree of energy by his desire to help along the others. Indeed, I have known of invalids, who, while watching such contests where one of their own family was contending, became seriously exhausted by just this sort of passive strain or expectant attention.

It should be borne in mind that there is a distinct physiological relief produced by the active forms of exercise which results in temporary breathlessness when followed by periods of rest. Physical and mental tension is relieved by profuse sweating; excitement is relieved to a great extent by over-accumulation of carbon dioxide, which is itself a sedative. I am convinced that I have suffered more fatigue from standing watching over the heads of a crowd an exciting foot-ball game than any individual member of those gladiators who had a much freer scope for their activities and were more suitably dressed for their work, and, above all, were properly trained

as well. Free action in a trained athlete is a dear delight; when out of training only is it a distress.

It is well to bear in mind that for children intrinsically weak (it may be both in their muscles and their nervous force), and whose organs may also be much below the average power of their other parts, muscular exercise must be hedged about with many safeguards and thoughtful modifications. It is doubtful whether such children should be even given much special exercise for their muscles alone, such as pulley-weights, dumb-bells, and gymastic efforts, unless these be of the lightest and in combination with other things, while it is equally important that they should not be allowed too large a scope for exercises of a complex nature. Deliberate and continued acts of which carpentering and gardening are familiar types are the best. Indeed, the use of tools, involving as it does interest to the mind, is second to none in value for young or old, weak or strong. Complex exercises, involving both force and swiftness, should be gradually worked up to. The most perfect form of gradual approach is in the form of regulated exercises devised by the Swedes, wherein the muscular acts are reduced to their fundamental principles in force and direction; and in the hands of a skilful operator a person is led step by step from the simplest acts to the most complex and forceful ones, and during this process the organs also grow accustomed to the graduated strain. When the individual is vigorous enough to perform little acts of skill, incentive is thereby added and the muscular work is better endured. By and by minor competitions have their place, and so long as these are held in due restraint all is well, and great benefit results from a judicious continuance. If incentive becomes gradually merged into excitement, then a peril threatens. Exciting competitions are only for the strong; innocent incentives in the form of music during muscular exercises is often added with advantage. This is particularly the case with the German Turn Verein and Turn Gemeinde; indeed, more than a passing allusion should be made to the Turner Bund, which in this country is now a very large and wide-spread factor and almost always for good. Here twice a week, as the custom is, the people come together, from the very young children—not babies, of course—to quite elderly people in their separate classes, doing work suited to their capacities, and usually to the sound of music, take a good hour's exercise, which being done together involves a little competition of individual skill and social intercourse.

Dancing is a most wholesome exercise if only it be not superadded to or grow into undue excitement. Fancy dancing for girls is of special value, graduated, of course, as it brings out the graces as well as strengthens the muscles, teaches equipoise, and especially benefits the loins and back, the weakest place, and usually the most undeveloped part in females.

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[1] See article by author elaborating the subject on "Puberty in Girls." Pediatrics, July 15, 1896.

DEVELOPMENT OF THE NERVOUS SYSTEM.

The development of the nervous system has points of similarity to the growth of a bank account, is subject to somewhat the same variations; at times inadequate, again fairly sufficient, on extreme occasions running so low as to come to the verge of being overdrawn, but under no circumstances can it be excessive. Nervous force grows most satisfactorily by slow and economical degrees; excitements of all sorts are perilous, inducing a waste in one way or another, and only robust natures accumulate enough to squander, lest, peradventure, the account be suddenly overdrawn and bankruptcy ensue. It is popularly admitted that the world is swayed by vigorous nerve force. Language is replete with terms, making nervous energy synonymous with courage, endurance, wisdom, and all those factors, in short, which are embodied in the term "success." It is alone the lack of nervous force which sometimes makes inefficient an otherwise sound bodily organism. On the other hand, a feeble construction, endowed with vigorous nervous force and energy, constitutes an efficient engine. An adequate accumulation then of energy in the nerve-cells and centres is the very fountain and mainspring of life. As we possess little or much of this are we useful beings; whether our actions are mainly mental or physical it is the same. When this energy is exhausted or run down, it must be wound up again, but, unlike the clock, it requires a long period of time to accomplish. Moreover, during this time all the vital organs tend to deteriorate structurally while this controlling force is withdrawn. To acquire nervous vigor its growth should suffer few and small interruptions. We see among country folk, laboring men, and savages, natures which are relatively little disturbed by protracted drains on their vitality, especially of the kind which induces physiological irritability in more complex beings, and this is due largely to their slow growth and simplicity of life, slowly storing up cellular energy. Such folks become not only well filled with force, but tenacious of it and well balanced. If their store be drawn upon they can well sustain the tax. Children whose lives are one long monotony may not be so bright and alluring, but are far more stable, better able to labor and endure. Their observation is simpler and slower, but their concepts and inferences are apt to be clearer. This storing up of vital energy should begin before birth. The about-to-be mother should sacrifice something to enable her to live quietly and healthfully. A vast deal of harm would be avoided as well as trouble to the mother and anxieties for her child if this prenatal period could be spent under natural and wholesome conditions. We have scarcely begun to know much about maternal impressions, but they are of deeper influence and significance than can yet be explained. Hurtful impressions are thus transmitted beyond a doubt, and beneficent ones even more truly and constantly. It is conceded that the finest known specimens of children are found among the British nobility, and, as has been said elsewhere in this paper, our insular cousins are more enduring

than we, certainly in physical competitions, as in long-distance running. The conditions of their early growth and development are hedged about with unusually wise safeguards. If, as has been objected by sentimental observers, these children see less of their parents than those of humbler folks, they are provided with the best possible substitutes in the way of care-takers and teachers; they are reared under the most perfect conditions as to surroundings, almost altogether in country places; whereas those children who are compelled to live with their parents—who, having a good many demands upon them, are unable to devote their best energies to the care and instruction of their offspring—are liable to grow up hap-hazard, and fall into many dangers, in spite of the best affection and intentions. Indeed, there is a very great peril to a child who is provided with too much or too solicitous affection from unwise parents, and, although home influences are inestimable in the way of character growth, nevertheless the exigencies of modern life too often call away the best energies of the parents, and children come in for what is left. A word may be said in passing of children who are backward mentally, a condition which frequently is only relative, being a state of instability of the nervous equilibrium, from which good or evil results may follow, depending upon the same conditions which help or prevent the growth of the nervous force in the body elsewhere. By far the most important considerations have to do with the acquirement of physical invigoration. If mental feebleness be once recognized, it is beyond measure important for the parents to seek skilful advice and to follow it closely. The education of the mind and of the body should go hand in hand, and all forced forms of mental training should be avoided. If the parent is able and willing to be the care-taker, and spend a good deal of time in the open air, especially the fields and barn-yard, thus insidiously teaching and moulding both mind and body, sharpening observation, and aiding in the formation of clear mental concepts, immense good can be accomplished, and not seldom the prevention of serious mental warping.

DEVELOPMENT OF MIND.

It may seem scarcely necessary to speak of the development of mind in pursuance of the subject of this paper; nevertheless, it is important that a few remarks be made as tending to show the connection which the brain and its processes have with enfeebled bodies. We occasionally see precocious minds endowed with very feeble envelopes. If such brains are over encouraged they are capable of using up too readily what little residual vigor there is in the entire organism. Precocity is a manifest peril; it is always of doubtful value; the very abnormality is evidence which should put us on our guard that we should aid in preserving not only the organic activities and framework, but, above all, the integrity of the mind itself. Other things being equal, the mind should receive little or no especial attention until the rest of the organism is fairly well repaired and put in working order. Actual instruction had better be delayed, and the teaching should

always begin with the simplest possible object lessons; suggestions such as emanate from well-conditioned, wholesome-minded folk should surround the child, even then keeping very close to simple, uncomplicated truths and their practical application. The method of teaching as outlined by that wise and good man Froebel is the healthiest both for the weak and the strong, and no system has ever been devised which approaches it in wholesomeness, certainly for very young children. Along with physical weakness there is inevitably a certain lack of mental vigor, and this must be particularly borne in mind, no matter how intelligent or bright a child may seem to its admiring parents or worshipping relatives. Mental processes are purely the outcome of physical activities, and there are in history conspicuous instances of great intelligence, and possibly wisdom, pointed out in wretchedly undeveloped bodies, yet such are always open to question, and in the ordinary course of every-day life we certainly cannot assume that this unnatural juxtaposition is probable. Therefore, it must be assumed from the outset that in a feeble body the mind must be handled with unusual delicacy and judgment to enable it to develop according to its possibilities, no matter how highly or hopefully we estimate these. At least the regularity of the organic activities must be fairly good to enable an organ of such astounding delicacy as the brain to grow naturally in size and power, and there must be maintained a very high order of cellular integrity to enable that organ to reach even a fair degree of energizing capacity and delicate differentiation. If this be true of early budding infancy when the whole organism is largely that of a vegetable, and until the time of early adolescence when the brain reaches its normal bulk, it is even more important that from thence on to the time of maturity, which is about the twenty-fifth year, every care be exercised to enable the natural perfection to be reached. When teaching then is admissible for a little one, it is a matter of much difficulty to decide just how much and of what sort this shall be, depending, of course, upon the material with which one has to build. However, the ordinary method of teaching language, and dividing it up into letters and constructed words, leading from thence to the principles of language, and finally to abstract thought, clothed too often in almost incomprehensible phrase, is certainly far from wholesome for those of the weaker sort.

Simple inductive reasoning from natural objects, of their quality, habits, and means of growth, is the sort of thing that should be pursued. The average teacher knows pitiably little about what the mind of man in this budding state is capable of doing. I would urge upon all who have any desire to know the truth to begin by learning what the ordinary concepts of a young child are and how they shape themselves, and how language, as ordinarily learned by them, so misleading, is capable of conveying thought.

REVIEW OF MEDICINE.

MEDICINE.

IN CHARGE OF JOHN H. MUSSER, M.D.,
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Narrowing of the Pulmonary Artery considered as a Manifestation of Tubercular Heredity. (*Gazette hebdomadaire de Médecine et de Chirurgie*, March 19, 1896.) By Victor Hanot, M.D.

Commencing with the remark that narrowing of the pulmonary artery is commonly looked upon as a cause of phthisis, Hanot reports three cases that seem to lead to another interpretation. The first was a male of twenty-six years; both parents had died of phthisis and he had always been delicate and, in his youth, slightly cyanotic. Examination of the heart revealed a harsh frémissement at the base and a loud systolic murmur in the second left intercostal space transmitted towards the middle of the left clavicle. The second patient was a female of twenty-six years, whose father had died of phthisis, and who had suffered from palpitation upon exertion; at twenty she had had an attack of acute articular rheumatism, and the cardiac phenomena were the same as in the preceding case; aside from a slight temporary bronchitis the lungs were normal. The third was a female of sixteen years, whose father had died of phthisis, and whose mother was suffering from the same disease. Two brothers had died of tubercular meningitis in youth. She had always suffered from palpitation, but never had from articular rheumatism; the lungs were intact; the heart presented the same phenomena as in the preceding case. Hanot discusses the possibility of this form of stenosis being similar to the congenital narrowing of the aorta such as occurs in chlorosis, and whether both are not manifestations of heteromorphous tubercular heredity. He believes that this narrowing may have absorbed the whole or the greater part of the inherited tubercular tendency, and that it acts therefore to a certain extent as an element of immunity against phthisis.

Traumatism as a Cause of Gastric Disease. (*Deutsche Archiv für klinische Medicin*, July, 1895.) By Wilhelm Ebstein, M.D.

The author discusses at great length the effect of injuries upon the

gastric mucous membrane. He first reports three cases, in which, shortly after severe muscular strain, such as the lifting of heavy weights, the patients had severe attacks of hematemesis, and subsequently developed the symptoms of gastric carcinoma. In one case the diagnosis was confirmed by the autopsy. Ebstein believes that the injury caused a hemorrhagic infiltration of the gastric mucous membrane or of the submucosa, and that the injured area was subsequently digested by the gastric juice. The manner in which the injury is caused is probably the sudden increase of blood-pressure, exerted upon some area of diminished vascular resistance in the gastric tissue. The lesion may even lead to perforation, as occurred in the first of the reported cases. Severe hæmatemesis may, however, occur without ulceration, as in a case that Ebstein observed, and which caused death from secondary anæmia, although nothing but submucous ecchymoses were found at the autopsy. In this instance the aorta was of the chlorotic type. These cases are usually associated with considerable enlargement of the spleen, and arise under the influence of general diseased conditions, particularly as a result of local disturbances of the circulation; and such conditions may even be recognized during life, such as compression of the vena cava ascendens. Two other cases are also reported similar to this except that the hemorrhage did not lead to death. Another group of causes are general injuries to the body, such as occur in severe falls. Ebstein reports ten such cases, three of his own and seven collected from medical literature, and in all of these the symptoms of gastric ulcer developed subsequently. It is not unlikely that they are due to vasomotor disturbances, particularly as the stomach is especially liable to such disturbances because of the tendency to rupture on the part of its vessels and the erosive qualities of the gastric juice. Among further causes of hæmatemesis he includes mechanical, thermic, and chemical injuries, and in illustration of the first he cites a case in which ulcer and perforation were produced by a rusty nail. Regarding the injuries caused by heat, he thinks it not impossible that liquids at a temperature of 50° C. or more may produce gastric ulcer, but only in cases that are already predisposed. In such cases, however, we are only justified in making a diagnosis of hæmatemesis following injury, as it is impossible to be certain that gastric ulcer is always produced.

Investigations concerning the Relation of the Blood-Serum of Healthy and Diphtheritic Children to Diphtheria Toxin. (*Wiener klinische Wochenschrift*, May 28, 1896.) By Johann Love, M.D., of Innsbruck.

About fifteen to twenty cubic centimetres of blood were taken from the arm and allowed to stand twenty-four hours in a cool place. A certainly mortal dose of toxin was mixed with from one-half to one gramme of the serum pro kilo of the animal, and the compound injected into guinea-pigs. In order to determine whether an injection of the healing serum would cause the serum of the individual to acquire antitoxin properties, a boy of

three years was bled, and the serum found to have no antidiphtheritic qualities. An injection of Behring's serum equal to 2000 A. U. was then made, and fourteen hours later the same blood not only delayed death in the guinea-pigs, but actually prevented it. Five cases were next tested to determine whether a prophylactic injection could be recognized, 150 A. U. being employed. The results were negative, and as a further proof of their slight utility one of the children under observation actually had an attack of diphtheria; a very mild one, however. By good fortune, a child, whose serum had been previously examined and found to contain no antitoxic qualities, suffered an attack of diphtheria. Fifteen days after recovery its serum manifestly delayed death in the guinea-pigs under experimentation, and at sixty days it had a distinct antitoxic influence. Love explains the lesser activity of the fifteenth day's serum by supposing that the reabsorbed toxins counteract, to a certain extent, the action of the antitoxins. In two cases where serum had not possessed any antitoxic properties during the course of the disease, antitoxins appeared after recovery, at least in sufficient quantity to delay death. In one case strongly antitoxic serum was found during the course of the disease; but, as in this instance cocci were found in the membrane and desquamation of the skin appeared, it was considered one of scarlet fever.

In two instances virulent diphtheria bacilli were found in the mouths of healthy children, and in both cases their serum was found to have strong antitoxic properties. On the other hand, toxins were found in the blood of a child suffering from a severe attack of diphtheria, that had failed to react to the serum treatment. Love believes that this case indicates the limitation of the value of Behring's serum, as it shows that, where patients are attacked in whom no antitoxin exists, the poison can produce so much injury to the organs that recovery is impossible. Finally, investigation upon two children suffering from indifferent diseases showed that human blood-serum may retain its antitoxic properties unaltered for a long series of weeks.

The Result of the Serum Treatment of Diphtheria in 1895 at the Kronprinz Rudolf-Kinderspitale. (*Wiener klinische Wochenschrift*, May 28, 1896.) By Dr. Zuppinger.

One hundred and sixty cases were tested, of which forty died, nine were moribund when admitted, so that the mortality after treatment was nineteen per cent. The cases were divided as follows:

Pharyngeal type, seventy-two treated, eight died; pharyngo-nasal type, thirty-two treated, thirteen died, of whom four were moribund when admitted; pharyngo-laryngeal type, fifty-six treated, nineteen died, of whom five were moribund. A marked decrease in mortality occurred as the year progressed, being forty-one per cent., twenty per cent., and sixteen per cent. in the first, second, and third periods of four months respectively. In January, seven of thirteen children died; in November, none of fourteen.

The doses employed were high, 2000 to 3000 A. U. in the first twelve hours and 1000 to 2000 more if no beneficial effect was noted in the first instance. No marked sudden result was observed. In some cases the fever diminished, in others it rose, in others it was unaffected. Albuminuria was not affected. Slight paresis occurred in these cases, but no post-diphtheritic paralysis. In no instance did croupous symptoms develop after an injection, and to this degree the extension of the membrane formation was hindered, but in several cases, particularly of the nasal type, the membrane persisted for days. In twelve cases laryngeal stenosis subsided after the injection without operation. This was an exceedingly rare occurrence in earlier years. The intubation period in the other cases was much shorter than in the ante-serum period. Cardiac paralysis, however, was more frequent in severe toxic cases than in previous years. In seven septic cases the serum was wholly without effect. In three it failed to prevent the formation of membrane in the stomach. The percentage of death, according to the day upon which treatment was commenced, is as follows: of those injected on the first day, ten per cent.; on the second, fifteen per cent.; on the third, twenty-eight per cent.; later, thirty-one per cent. One hundred and twenty-two cases were investigated bacteriologically, forty-five being almost pure cultures, forty-four mixed forms, and thirty-three not showing Löffler's bacillus. The mortality of the first group was thirty-seven per cent.; of the second, thirteen per cent.; and of the third, twenty-one per cent. The thirty-four autopsies showed that the commonest causes of death were complications in the lungs and bronchi and degeneration of the heart and kidneys. Of twenty-nine children that had been exposed to contagion and were inoculated prophylactically, one was attacked, but it is likely that the disease had already commenced. In conclusion, Zuppinger does not hesitate to declare Behring's serum by far the best treatment yet discovered for diphtheria.

[The article is very carefully and logically written, and is probably the most impartial statistical study of the results of the serum treatment that has yet appeared.]

Immunization against Serpent's Venom. (*British Medical Journal*, April 18, 1896.) By Professor Fraser, M.D., LL.D., F.R.S., of Edinburgh.

The serum of a horse that had received a dose of cobra serum representing twenty times the minimum lethal is fluorescent, and when dried yields about ten per cent. of solid residue, which retains its antivenomous properties unchanged for an indefinite length of time, and can be readily restored to its original liquid state by dissolving in water. With this preparation four series of experiments were performed. In the first it was mixed with the cobra venom outside the body and the mixture then injected. The results showed a remarkable accordance between the increment required in the dose of antivenene and each increment in the dose of venom, amounting to

about .3 cubic centimetre per kilo of body-weight for each unit from twice the lethal dose upward. It is apparently possible by this method to prevent the fatal effects of almost any dose of venom. In the second series the venom and antivenene were injected separately but simultaneously, and it required 3.5 cubic centimetres per kilo of antivenene to prevent death from one and one-half times the lethal dose of venom. In the third series the antivenene was injected thirty minutes before the venom, and the protective quantities were less than those required in the second series. In the fourth series the antivenene was injected thirty minutes after the venom, and not less than five cubic centimetres per kilo were required for twice the minimum lethal dose. Fraser concludes that it is impossible not to believe that the reactions are chemical and not physiological when the great difference between the effects of mixture *in vitro* and separate injection are considered, and that the antivenene directly neutralizes in some manner the toxic principles of the venom.

Venom, sometimes in enormous doses, was next administered by the stomach to white rats and to a cat without producing any symptoms whatever; but the animals subsequently exhibited considerable immunity, resisting one and one-half times the minimum lethal dose, and it was discovered later that the cat had communicated this immunity to her suckling kittens. It thus appears "that serpent's venom introduced into the stomach in large quantity, in a quantity which, if injected under the skin, would kill one thousand animals of the same species and weight, while it failed to produce any definite symptoms of poisoning, nevertheless produced in a few hours complete protection against the lethal effect of a dose of venom more than sufficient." That the same result holds good of the human race seems indicated by a personal observation of Mr. Alfred Bolton. The serum of the serpents themselves, notoriously immune to their own poison, was next tested, and found to possess strong antitoxic properties, either when tested against the venom of other serpents or their own. In conclusion, Fraser regrets that no proof is yet at hand of the practical value of antivenene in human beings; but suggests that, in spite of the large dose required,—about three hundred and fifty cubic centimetres,—it should be employed, and if possible, in connection with ligation, should the bite affect a limb. In such a case it should be injected both above and below the ligature.

A Fatal Case of Pancreatitis with Hemorrhage. (*Lancet*, March 14, 1896.) By Dr. Rolletson.

The patient had had two severe attacks of epistaxis, but had otherwise always been perfectly healthy. Without any prodromal symptoms, whilst at work, he was suddenly seized with intense abdominal pain; this improved only to recur more severely, and later there was scanty bloody vomit. Upon admission, aside from slight distention of the abdomen, there were no abnormal physical signs. He complained of pain around the lower border of the ribs, in the umbilical region, and particularly in the small of the

back. There was slight tenderness upon pressure midway between the ensiform and umbilicus. The bowels did not move and the urine was normal. Death occurred in collapse. At the autopsy a retroperitoneal blood-clot was found, infiltrating the tissues in front and below the pancreas and covering the kidneys and adrenals. Several ounces of fluid like milk [chyle?] were found enclosed in the sac of the omentum. A white, opaque putty-like material was found lying between the lobules of the pancreas, and this proved to be necrosed fat. There was no peritonitis. [Unfortunately, the case has been so carelessly studied that it fails to add to anything but the statistics. The source of the hemorrhage, the nature of the milky fluid, and a bacteriological examination would have added much to its value. Clinically, it seems very possible to diagnose the condition during life, and we have observed two cases in which such a diagnosis was made and proved by the autopsy to be correct.]

Polymyositis Acuta, with Report of a Case presumably of Syphilitic Origin (Myositis Syphilitica). (*American Journal of the Medical Sciences*, April, 1896.) By James Herrick, M.D.

The patient was a Norwegian, twenty-four years of age, whose husband had had syphilis, and who had herself had some tertiary manifestations. The disease commenced with swelling in the right forearm, and later both calves were attacked; the swelling was either circumscribed or diffuse, and very painful. Although the tissues appeared œdematous, there was no pitting upon pressure, and only slight reddening of the skin. The patellar reflexes were exaggerated. On incision into the left gastrocnemius a light brownish-red fluid escaped containing fragments of old blood-clots. Bacteriological examination of this fluid and of the excised muscle were negative. Improvement, which had begun without treatment, continued rapidly after the administration of the iodides, and subsequently there was no trace of muscular atrophy. The excised muscle exhibited extensive and diffuse inflammatory change, with hyaline degeneration.

The Diaphragm Phenomenon. (*Medical Record*, December 28, 1895.) By Dr. Litten, of Berlin.

Litten defines the phenomenon as "the visible expression of the gradual detachment of the diaphragm from the walls of the thorax, and its gradual opposition to the thoracic walls while it rises during expiration." This physiological movement is plainly marked upon the thoracic wall by the regular rising and falling of a peculiar shadowy line, caused by the motion of the diaphragm and denoting its momentary position, and this line may be seen upon the chest of every individual, healthy or diseased, unless morbid processes be present that interfere with the motility of the diaphragm. The appreciation of the shifting of the respiratory organs is greatly increased by this phenomenon. The normal excursion of the diaphragm amounts, on the average, to from two and two-fifths to two and four-fifths inches. A smaller

excursion usually indicates emphysema, and the position of the diaphragm is one or two interspaces farther down, or even as low as the costal margin. In general debility the excursion is less, but the diaphragm is normal in position. It is in unilateral disturbances that the method achieves its greatest triumphs. If the phenomenon is absent on either side and normal on the other, there is either a considerable effusion of air into the affected pleural cavity or pneumonia of the lower lobe. In case of serous effusion, slight motions of the diaphragm are often visible abnormally far downward. In extensive attachment of the diaphragm to the lungs, spleen, or liver, and especially in cicatricial retractions of the thorax, the movement is much restricted. An area of dulness in the lower part of the thorax, not due to the liver or spleen, with the phenomenon visible above the dulness but diminished in extent, indicates a subphrenic abscess. In intrathoracic tumors the diaphragm, if visible, is very low, and it is usually invisible where there is extensive ascites, diffuse peritonitis, or considerable meteorismus, although it can be observed where there are large tumors of the spleen or liver. In a case of acquired diaphragmatic hernia, the phenomenon was visible below the tympanitic area. The method is particularly useful in judging the condition of the lungs after pleuritic effusions and injuries, and of the effects of treatment in these conditions and emphysema.

A Case of Diffuse Phlegmonous Gastritis. (*Lancet*, March 14, 1896.) By T. M. Kelynack, M.D., of Manchester.

The patient had suffered from occasional dysphagia and vomiting for five years. Examination revealed a non-painful stricture of the œsophagus just above the diaphragm. There was slight rise of temperature and collapse followed by death. At the autopsy a fibrous stricture was found in the lower part of the œsophagus, riddled with sinuses, with a large submucous abscess just above it. The wall of the stomach was thickened and an abundant sero-purulent exudation oozed from the cut surface upon gentle pressure. Microscopically there was a purulent infiltration of the deeper part of the mucosa and especially in the submucosa. There was evidence of degenerative changes in the muscle-cells. Sections stained by Gram's method showed numerous short rod-like organisms, resembling the bacillus coli communis.

THERAPEUTICS.

IN CHARGE OF ALEXANDER D. BLACKADER, B.A., M.D.,
Professor of Therapeutics, McGill University, Montreal, Canada,
ASSISTED BY
D. J. EVANS, M.D.

Treatment of Diphtheria by Hydrochlorate of Pilocarpine. (*Wratsch*, Nos. 45–48, 1895.) By M. S. Barsky.

The author reports the results of observations made in a recent epidemic of diphtheria. Out of ninety-five cases, thirty-one have ended fatally; the epidemic, then, was quite severe. Out of these patients forty-eight were treated by pilocarpine alone, and only eight died; out of seventeen patients treated by serum and pilocarpine at the same time there have been only three deaths; lastly, out of twenty-four cases not treated, there were nineteen deaths.

Again, out of sixteen cases not treated, there were fourteen deaths, whilst out of twenty-three cases of equal gravity in which pilocarpine was used, only seven patients were lost.

Under the influence of this remedy the local phenomena are ameliorated; five or six hours after the injection and following abundant salivation, the coats soften and the false membranes are thrown off. It is rare for the false membrane to reappear; in two or three days the pharynx is completely cleansed. The general condition becomes better at the same time. The author has seen no accident directly established by pilocarpine. Pilocarpine may be advantageously employed with serum, since the latter acts against the Klebs-Löffler bacillus alone, whilst the former gives favorable results in the case of mixed infection.

The curative effects of pilocarpine are explained by the following facts: First, in increasing the secretion of saliva, pilocarpine favors the softening and the detachment of the false membranes, and removes the bacteria from the mouth mechanically; second, under the influence of pilocarpine the saliva becomes acid; now, this is an improper medium for the development of the diphtheria bacilli; third, the increased perspiration and the increase in the secretion of saliva and of mucus favor the elimination of toxins; fourth, pilocarpine gives rise to leucocytosis.

For the internal administration of the drug the following formula may be employed.

℞	Pilocarpin. hydrochloratis,	0.02	gr. ⅓
	Ammonii carbonatis,	1.00	gr. xv.
	Potassii hydrochloritis,	2.00	ʒss.
	Aquæ destillatæ,	60.00	℥ij.
	Spiritus vini gallici,		
	Syrupus senegæ, āā	30.00	℥j.—M.

Of this mixture may be given every hour a teaspoonful, a dessertspoonful, or a tablespoonful, according to the age of the patient.

In severe cases a beginning may be made by injecting a quarter of a syringeful of a two-per-cent. solution of pilocarpine, and then, to keep up the action of the drug, it may be given by the mouth. If there is no improvement at the end of twenty-four hours, another injection is given; but the author has not had to give more than two. In case pilocarpine is to be associated with antidiphtheritic serum, the pilocarpine should be given hypodermically and by the mouth at once, and the serum should be used the following day if there is no improvement. The author has never had to use local treatment.—*Gazette des Hôpitaux*, April 28, 1896.

The Presence of Arsenic in Cigarettes. (*British Medical Journal*, July 11, 1896.) By William Murrell, M.D., F.R.C.P., of London.

In a preliminary report of investigations made by Dr. Murrell and his colleague, Dr. Hale, both of Westminster Hospital, as to the presence of arsenic in cigarrette-wrappers,[1] the following interesting results are presented. The tests were based mainly on those of Reinsch and Marsh, though these were checked by others. In some instances a dozen or more tests were made of the same brand of cigarette, to avoid possibility of error. Where the papers were of complex design or printed in more than one color, different portions of the wrapper were separately examined. "Inserts," such as pictures painted in colors, were also closely tested. Tobacco in tins was also submitted to examination. The opinion is positively given that the color of the paper affords no indication of the presence of arsenic; indeed, notwithstanding the general belief that green papers contain this drug, many of that color are free from it. In proof of this statement, Dr. Murrell's tests of wrappers of vivid green, bright bluish-green, pale-green, and bright green cases showed no trace of arsenic; this, however, is to be contrasted with a test of the bright green wrappers of tobaccos, of cigarettes, the bright green cases of cigarettes, and the very pale bluish-green wrappers of the same, which contained arsenic; still further, the bright yellow paper of tobacco, and the blue, red, yellow, and gold wrappers of cigarettes, as also the blue, buff, white glaze, and blue satin cases, contained no arsenic. Out of seventeen series of different kinds of cigarettes and tobacco, arsenic was present in the labels of six, or more than a third. The arsenic in these cases was present in such large quantities that no difficulty was experienced in demonstrating the fact. The report closes with the conclusion that the presence of arsenic in these wrappers of cigarettes must be attended with considerable risk, as the coloring matter, especially when moist, rubs off on to the fingers, from which they are transferred to the cigarette. In most cases in this industry the cases and papers are spread by girls, who must therefore of necessity absorb a good deal of the arsenic. The danger is clearly both to the consumer and manufacturer. Moreover, the presence of

[1] By the term "wrapper" is meant the colored case or packet in which the cigarettes are sold, not the rice-paper in which the tobacco is rolled.

arsenic is not at all confined to the cheaper brands, as it occurs abundantly in the higher-priced packets. The report also suggests that, as the inhalation of arsenious acid even in minute quantities for a considerable time produces cough, hæmoptysis, expectoration, and loss of flesh, which are readily mistaken for phthisis, the advantage of accurate knowledge concerning this subject is most apparent.

Permanganate of Potassium in Opium-Poisoning. (*British Medical Journal*, June 13, 1896.)

Vutchetitch (*Srpski Archiv za Tzelokupno Lakarstvo*, Nos. 2 and 3, 1896) relates a case of severe opium-poisoning in a boy two and a half years old, who accidentally swallowed "from twenty-five to fifty drops" of tinctura opii simplex (Ph. Germ.). About an hour later the writer injected subcutaneously a Pravaz syringeful of a one-per-cent. solution of potassium permanganate, and simultaneously gave the boy a teaspoonful of the solution internally. The subsequent treatment was limited to an internal administration of the antidote in the same dose hourly, and later on every two hours. About fifteen hours after the poisoning the child was found playing with other children, though looking somewhat pale and dull. On the next day the boy was quite well. The Servian paper contains an exhaustive analysis of international (British, American, German, Austrian, Russian, etc.) literature on the subject.

SURGERY.

IN CHARGE OF HENRY R. WHARTON, M.D.,

Demonstrator of Surgery and Lecturer on Surgical Diseases of Children in the University of Pennsylvania; Surgeon to the Presbyterian Hospital, the Methodist Episcopal Hospital, and the Children's Hospital; Consulting Surgeon to the Presbyterian Orphanage,

JOSEPH P. TUNIS, A.B., M.D., Assistant Demonstrator of Surgery in the University of Pennsylvania, AND J. P. ARNOLD, M.D., Medical Superintendent of the Presbyterian Hospital.

A Case of Arrest of the Heart's Action and of Respiration during Chloroform Anæsthesia; Bleeding from Internal Jugular Vein; Recovery. (*British Medical Journal*, July 18, 1896.) By H. F. Waterhouse, M.D., and Charles Gibbs, M.D.

S., aged seventeen, was suffering from tuberculous disease of the glands of the right side of the neck. Examination of the heart and lungs found them to be normal, and removal of the affected glands was recommended. Chloroform was administered on a Skinner's mask, and the operation was undertaken. Chloroform was selected on account of the patient's youth, his heart being healthy, and also because of the existence of post-nasal vegetations which it was feared ether would cause to increase. For the first forty minutes of the operation everything went well. But just at the time

when all the diseased glands seemed to have been enucleated, the patient, who had been breathing quietly and evenly, made three attempts at retching. The mask was sprinkled with chloroform and reapplied for not more than thirty seconds, when suddenly the patient became very pale, though blue about the lips; the pupils dilated widely, the pulse ceased, and respiration stopped after three shallow inspirations. The heart's action ceased some seconds before respiration failed. The patient's mouth was immediately opened by a Mason's gag, the tongue drawn well forward with forceps, the foot of the operating-table raised to an angle of forty degrees, and artificial respiration performed about twenty times per minute by compression of the lower chest. At the same time brandy was injected by the nurse. No effect was produced, and to all appearance the patient was dead, and so considered by every one in the room. The doctor now determined, as a last resort, to open the internal jugular vein and compress the lower chest, to relieve the distended right ventricle. Several ounces of blood rapidly escaped, and after the jugular had been clamped by two forceps, artificial respiration was resumed. In less than half a minute the patient made a faint inspiration, followed in a few seconds by another, and, artificial respiration being continued energetically, the heart was heard to beat, at first slowly, but soon the pulse and respirations gained in strength and frequency. The operation was now completed without further administration of an anæsthetic. This case is deemed of importance, as demonstrating that the bleeding from the internal jugular vein, by relieving the distention of the right heart, was the main factor in bringing about the recovery of the patient from an apparently hopeless condition, and it is believed that the treatment applied here with such success should be tried by surgeons in similar cases where artificial respiration alone has failed to revive the patient. The essential point seems to be that the veins to be opened should be as large and near to the heart as possible, in order that the issuing stream of blood should be of considerable volume and the relief to the heart as rapid and thorough as possible.

On the Treatment of Inoperable Cases of Carcinoma of the Mamma by Removal of the Uterine Adnexa and Administration of Thyroid Extract. (*Lancet*, July 11, 1896.) By George Thomas Beatson, M.D., Edinburgh.

Dr. Beatson gives a detailed account of three most interesting cases of mammary cancer. The woman had had the left breast excised, and a large area of skin free of tumor had been taken away. The patient left the hospital almost well, seeming to have made a good recovery. About a month thereafter she noticed an opening of the wound, with discharge and shooting pain. She returned to the hospital for further advice and was again received for a few days, but was then discharged, and it was thought an operation would be useless. The journal report was as follows: "Dismissed. General involvement of whole scar by large tumors, cancerous in

nature, to remove which entirely was thought to be impossible. Adherent axilla and chest walls. One of the wounds from the recurring secondary tumors has given way, and there is now an ulcerated surface." The case having been placed in Dr. Beatson's care, an opportunity was afforded him to test practically his views of the nature and etiology of cancer, which are entirely opposed to the local parasitic theory of the disease. The author agreed fully with the opinion expressed at the Royal Infirmary, the hospital referred to, that local removal was unjustifiable. But he asked himself, could the disease be attacked by any other channel? Is cancer of the mamma due to some ovarian irritation, and if so, would cell-proliferation be brought to a stand-still, or would the cells undergo the fatty degeneration seen during lactation, if the ovaries were removed? With the view that in inoperable cases the administration of thyroid extract might influence the growth and work in time a cure, he commenced this treatment, but after a month perceived no appreciable effect. He then decided, on the lines of his theory that the ovaries and tubes were in some way concerned in the development of the growth, to perform the operation of removing the tubes and ovaries. The operation was done on June 15 of last year; the right ovary seemed healthy, the left one was somewhat cystic. The patient made a good recovery, and on June 28 was sitting up. No local application was made to the diseased areas on the thorax. They were simply kept clean with boric lotion and dressed with protective and boric lint. On July 12 the administration of the thyroid tabloids, three daily, was resumed, it being probable that there was present an amount of cancerous material which a powerful lymphatic stimulant like thyroid extract might remove. On July 19, five weeks after the operation, marked improvement was noted, the tissues being softer and more pliant. On August 12 the local improvement had still continued; the patient's general health was satisfactory, and she was allowed to leave the vicinity, to report from time to time. On October 12 the woman reported herself as feeling very well, and looked so. She was taking four- or five-grain tabloids of thyroid extract daily. Eight months after the operation the doctor was able to show her with a sound cicatrix and healthy thoracic tissue, and apparently in good health.

The next case reported by Dr. Beatson was of a woman aged forty, with a large tumor of the right mamma. Her family history was satisfactory, menstruation had commenced at thirteen, and still continued. The tumor was densely and uniformly hard, and adherent to the skin over a large area. She also had applied to a hospital, but admission was refused, as operation was considered inadvisable. Dr. Beatson was of the same opinion, as the disease was evidently carcinoma. An unfavorable feature of the case was the implication of the glands, not only of the neck but of the axilla. The tubes and ovaries were removed, the operation not being an easy one, owing to the adherent uterine adnexa. Recovery, however, was uninterrupted. This case was also treated with five-grain thyroid tabloids twice daily, and in five weeks after operation the neck was freely movable in any direction.

A third case was that of a woman aged forty-nine, with cancer of the left breast, which had been eaten away almost as if removed by excision. As her menopause had occurred two years previously, it was not deemed advisable to remove the tubes and ovaries, but administration of the thyroid tablets was resorted to. No marked effect on the sore has up to date been observed, and removal of the ovaries and tubes, notwithstanding the occurrence of menopause, may yet be done, in which case the doctor will report the effects.

The conclusions drawn from these cases are: 1. That there seems to be evidence that the ovaries and testicles have control in the human body over local proliferations of epithelium. 2. That the removal of tubes and ovaries has effect on the local proliferation of epithelium which occurs in carcinoma of the mamma, and helps on the tendency which carcinoma naturally has to fatty degeneration. 3. That this is best seen in cases of carcinoma in young people,—a class of cases where local removal of the disease is often unsatisfactory.

The Detection of Spinal Caries by the Röntgen Process. (*British Medical Journal*, June 6, 1896.) By Noble Smith.

The author speaks of the value of skiagraphy in obscure cases of spinal caries, and cites two cases in which the process was especially serviceable to him. One was a boy of five and a half years, with persistent contraction of the right sterno-mastoid muscle, with a lateral curvature of the cervical spine and some œdema of the neck. The absence of caries of the spine is clearly shown in a skiagram taken by Mr. Sydney Rowland.

The second case was that of a young woman of twenty-seven years, who complained of severe pain in the cervical and upper dorsal regions upon the least movement and a choking sensation upon attempting to swallow. The symptoms had been attributed to hysteria. The skiagram showed distinctly severe disease above the fourth cervical vertebræ.

Mr. Smith concludes by stating that this diagnostic process must be most applicable in the neck, for except in very young children the obstruction caused by the sternum and other dense tissues interferes with a satisfactory shadow of the vertebræ.

A Method of temporarily closing the Opening after Gastrostomy or Enterotomy. (*British Medical Journal*, June 6, 1896.) By Harrison Cripps, F.R.C.S.

Mr. Cripps makes use of a circular disk of sheet rubber about the thickness of a silver quarter, through which he passes, a little to one side of the centre, a thread of No. 4 silk. The thread is passed back again at a little distance from the original puncture. The two ends of the thread are now parallel and are left about six inches long.

The disk is made into a circular roll and kept in this position by the jaws of a pair of hæmostatic forceps. The roll is then introduced length-

wise through the opening into the bowel or stomach, and when released from the forceps immediately expands to its original circular form. By drawing up the two strings the disk is lifted against the mucous surface and effectually stops anything coming through. The disk is kept in position by tying the two ends of the silk thread over a roll of lint the thickness of a pencil and stiffened with a wire or pin. The roll is laid crosswise over the external opening.

For feeding the patient or obtaining relief all that is necessary is to untie the thread, remove the roll of lint, and, holding on to the thread lightly, push the disk back into the bowel with a director.

The author states that he has found this method absolutely effectual in keeping patients dry and clean.

NEUROLOGY.

IN CHARGE OF LANDON CARTER GRAY, M.D., New York City,
GUY HINSDALE, M.D., Philadelphia,
WILLIAM BROADDUS PRITCHARD, M.D., New York City, AND WM. G. SPILLER, M.D., Philadelphia.

Concerning Cavity-Formation in the Medulla Oblongata and the Anatomical Bulbar Lesions in Syringomyelia. (*Arbeiten aus dem Institut für Anatomie und Physiologie*, edited by Professor Obersteiner, No. 4.) By Hermann Schlesinger, M.D.

Dr. Schlesinger draws the following conclusions:

1. The formation of cavities in the oblongata may occur in a neoplasm or without important neoplastic change in the tissues.

2. The latter form may be found in connection with syringomyelia or as an independent bulbar affection.

3. The bulbar cavities or streaks of neuroglia are in typical positions.

(*a*) Those laterally situated usually extend from the hypoglossal nucleus, or from the area to the outer side of this, ventrally and laterally in the direction taken by the roots of the vagus, and reach as high as the lower end of the pons.

(*b*) Those situated mesially lie exactly in the middle line and extend as high as the beginning of the fourth ventricle.

4. On account of the typical locations of the cavities typical lesions are produced. From the lateral position these are: degeneration of the lemniscus, of the restiform body, of the spinal roots of the ninth, fifth, and eighth nerves, and of the direct cerebellar tract, very often also unilateral degeneration of the bulbar nuclei of the lower portion of the oblongata, the olives, and the pyramidal tracts.

5. The involvement of the pyramidal tracts may be explained in great part as retrograde degeneration of the central fibres of the cranial nerves.

6. The cavities in the lateral portion of the oblongata may possibly be caused by lesions of the vessels. In favor of this view are morbid findings (softening, hemorrhage in this part), experiments in the injection of the vessels, the constant changes found in the vessels of the oblongata near the cavity. The loose formation of the tissue in this portion predisposes to the affection.

7. Errors of development play an important *rôle* in the formation of the mesially situated cavities.

8. When clinically certain bulbar nerves escape and others are involved hydrocephalus and tabes must be thought of as complicating processes. Often when the third and fourth are paralyzed or the optic nerve is involved, a complication of syringomyelia with some other anatomical process may be thought of.

9. The bulbar affections in syringomyelia, even the bilateral, may easily be distinguished anatomically from those in tabes.

Pathology of Multiple Sclerosis (clinical portion). (*Wiener klinische Rundschau*, 1895.) By Emil Redlich, M.D.

Multiple sclerosis has usually a very chronic course; the average duration is from eight to ten years. In a few cases death has occurred within a short period. The disease may show a series of acute attacks, separated by periods of remission; in such cases the pathological findings consist of acute destruction of tissue or acute degeneration about chronic foci. Some of the symptoms are due to functional disturbance. Many of the axis-cylinders are preserved, as is well known. Redlich is not inclined to believe in the restoration of fully degenerated central nerve-fibres, although recovery may occur after slight changes in the axis-cylinders and destruction of the medullary sheaths. Hemiplegia, which may be the first sign in apparently healthy individuals, following which the other symptoms develop, or which may occur in the course of the disease, and, as a rule, is of short duration, although in some cases lasting a considerable time, is supposed by many to be due to vascular conditions. Redlich believes that in most cases the cause is to be found in sclerotic foci in the pons or oblongata, which are not uncommon in multiple sclerosis, whereas such foci are rare in the cerebral cortex and internal capsule. In many of these cases the cranial nerves are involved, a fact which favors this theory. The hemiplegia is due to degeneration of the medullary sheaths of the pyramidal fibres, which for a time interferes with the function of the axis-cylinders.

The intention tremor is a sign of weakness, conduction of impulse is possible, but promptness of movement is impaired. It may be compared with the tremor seen after exhaustion. It is not the same as ataxia. It is, therefore, impossible to assume a lesion of any one distinct region as the cause of it; the same may be said of the nystagmus, although it seems that this is probably due to involvement of the central fibres of the nerves to the eye-muscles.

The defects of speech are due to involvement of the nuclei in the oblongata, and, although these centres control also the muscles of expression, deglutition, etc., the highest function—speech—suffers first, later the symptoms of progressive bulbar paralysis may be noticed, and the autopsy reveals in such cases extensive involvement of the oblongata and pons, as shown among others in two cases examined by Redlich.

The symptoms of transverse myelitis may develop acutely in the course of multiple sclerosis, or may be the only ones indicative of the disease, and the microscopic examination shows in such cases acute changes in the thoracic portion of the cord. It is questionable whether there is a purely spinal form of the disease. When the symptoms of transverse myelitis appear, even acutely, in youthful vigorous persons, and there are no signs of caries or syphilis, disseminated sclerosis should always be thought of, even when the ordinary signs of the malady are absent.

Redlich reports a case of spastic spinal paralysis due to foci of multiple sclerosis in the brain and cord. Although there was no secondary degeneration in the pyramidal tracts, marked contractures had been noticed in the lower extremities. Cases of spastic spinal paralysis with optic atrophy are usually due to disseminated sclerosis. Not all cases of apparent multiple sclerosis in which no pathological findings have been observed are to be attributed to hysteria.

Cephalic Tetanus; General Tetanus associated with Hemifacial Paralysis; Recovery. (*University Medical Magazine*, June, 1895.) By De Forest Willard, M.D., and James I. Johnston, M.D.

There have been only three cases of tetanus with the coexistence of unilateral facial paralysis reported in America, and the one recorded by Drs. Willard and Johnston is the first case with recovery in this country. Cephalic tetanus is produced by an injury of one of the cranial nerves. Usually the onset is slow. The severity of the disease is determined by the rapidity of onset and development.

In this case there had been a slight wound from a stick near the inner canthus of the right eye; a week after the accident spastic gait and paralysis of the entire right facial nerve with trismus were noticed. Stiffness of the muscles of the legs, abdomen, back, and neck, with opisthotonos, developed. The slight wound did not suppurate, and no material could be obtained for cultures. The rigidity of the legs became so great that passive movements were almost impossible. Pain was chiefly complained of in the right heel and calf of the leg. The temperature rose at one time to 101.4° F. The reaction of the facial nerves to electricity was not altered to any extent, as tested by Dr. James Hendrie Lloyd. About a month after admission the patient was quiet and rational, there was still slight rigidity, but he could move all his limbs and open his mouth easily. Recovery was perfect after an illness of about two months.

The important features in this case are:

1. General traumatic tetanus of a chronic nature, with recovery.

2. Unilateral facial paralysis, which disappeared with recovery from the tetanus.

3. An insignificant wound involving filaments of a cranial nerve.

4. No markedly asthenic condition or threatened asphyxia throughout the course of the disease.

5. Decided improvement for a week after subcutaneous section of the nerves in the injured area.

6. Origin of the infecting bacillus in the earth, and infection through the eyelid.

The antitoxin for tetanus could not be obtained. The treatment consisted of bromide, chloral, and deodorized tincture of opium, milk diet, an occasional enema, subcutaneous section of the nerve-filaments leading to the cicatrix, and confinement to a darkened, isolated room.

Two Cases of Acute Transverse Myelitis. (*Nouvelle Iconographie de la Salpêtrière*, 1895.) By J. Nageotte, M.D.

These two cases of acute myelitis were clinically and to a certain degree pathologically much alike, but different etiologically. Both presented the symptoms of complete, acute, flaccid paraplegia of the lower extremities with preservation of the cutaneous reflexes, but with involvement of bladder and rectum. Dissociation in the sensory disturbance was noticed in the first case, and in the second complete loss of sensation in the lower limbs and part of the trunk; in both decubitus developed. The head and upper limbs were not involved in the first case; there were symptoms referred to the base of the brain in the second. The microscope showed in both cases myelitis of the thoracic region, from the second thoracic to the eighth thoracic in the first case, and from the eighth cervical to the tenth thoracic in the second. In both the pia was infiltrated in all parts of the cord, but also at the base of the brain in the second. Secondary degeneration was observed in both. From these facts one would be inclined to believe that the two cases were exactly similar, especially as death occurred after five weeks in one and six weeks in the other. The second patient was known to be syphilitic; examination of the liver revealed a cellular infiltration similiar to that in the cord. The first patient had had no premonitory symptoms, these had been present in the second case, but the most important difference was in the nature of the infiltration. The cells in the first case contained irregular nuclei, sometimes well stained, sometimes imperfectly if undergoing degeneration, and surrounded by a considerable amount of protoplasm. The infiltration of the second case consisted of cells with round small nuclei surrounded by almost invisible protoplasm. The first was a purulent infiltration, the second is seen in syphilis.

Dr. Nageotte does not believe that abrupt development of symptoms in every case of spinal syphilis is due to mechanical obstruction of diseased vessels: this may be from acute inflammation of the nervous tissue.

A New Cause of Saturnine Intoxication. (*Comptes Rendus des séances de la Société de Biologie*, June 1896.) By J. B. Charcot, M.D.

A woman who had had intense colic accompanied by obstinate constipation visited the Salpêtrière with bilateral paralysis limited to the extensors of the hands. The mouth was kept very clean, so that no blue line was found. She had been engaged in making artificial flowers, and used a large amount of a certain kind of green paper, which she handled with fingers moistened by the tip of the tongue. Analysis revealed a large quantity of lead in this paper. Individual predisposition for lead-poisoning was clearly shown, she being the only one among the workers who was affected.

A Case of Leontiasis Ossea, Megalocephalie, or Hyperostosis Cranii. (*British Medical Journal*, June 6, 1896.) By W. Hale White, M.D.

When three years old the patient fell from a window into the street, and claims that his present deformity dates from that time. Three years ago he first noticed slight stiffness with pain about the right shoulder-joint, and the arm and forearm began to waste. There is no evidence of gonorrhœa or syphilis.

At present there is a very prominent ridge of bone running round the head horizontally. It displaces the auricle downward, the upper margin blends with the general bony surface of the skull, and the lower edge is equally difficult to define. The maximum circumference of the head is twenty-four and one-half inches. The patient is extremely and equally deaf in both ears to bone and ordinary conduction. He is very intelligent. Pupils are equal and react normally; optic disks are healthy and there is slight nystagmus.

The thyroid appears normal; the bones of the face are not involved.

The arm appears to be affected with rheumatoid arthritis and associated muscular atrophy. The patient has no headache and no sensory symptoms. A photograph taken at the age of five shows the deformity of the head very plainly.

The Spinal Cord in Pernicious Anæmia. (*Journal of Nervous and Mental Disease*, April, 1896.) By James Hendrie Lloyd, M.D.

In 1893 the patient had what he described as a severe attack of gastro-enteritis, from which he never completely recovered. Weakness had been gradually increasing for two years, paræsthesia in the legs and girdle sensation about the abdomen had also been noted. There was no ataxia and no involvement of rectum or bladder. When examined in 1894 the knee-jerks and objective sensation were normal, the anæmia was great, the patient was very weak, and attacks of sudden and temporary localized œdema were noted. The patient likewise suffered from irregular diarrhœa. An examination of the blood showed at one period 648,000 red blood-corpuscles to a cubic millimetre, the hæmoglobin became as low as sixteen per cent.,

white blood-corpuscles 3040 to a cubic millimetre, macrocytes, microcytes, many poikilocytes, some nucleated red cells were observed. An examination of the eye-grounds showed numerous hemorrhages.

Microscopic examination of the thoracic region of the spinal cord revealed normal tissue in the posterior columns adjoining each posterior horn and the gray commissure, also along the periphery of the cord. The degeneration was less dense about the posterior median septum. The posterior root-zones were not seriously involved. In the lumbar region the posterior columns were almost normal.

In the lateral columns there was proliferation of neuroglia and some of the nerve fibres were greatly distended; in some of these the axis-cylinders were absent. This distention was considered an early stage of degeneration, probably due to the action of some toxic substance on the nervous elements. The membranes were not distinctly involved.

The author considers that loss of knee-jerk, ataxia, and subjective sensory symptoms probably depend on the degree of destruction in the posterior root-zones.

The range of temperature in this patient indicated the presence of some irritant or toxic substance in the blood; the persistent diarrhœa may also have been of some significance.

The Frequency of Laryngeal Paralysis in Hemiplegia. (*Revue Neurologique*, June 15, 1896.) By Dr. Simerka.

The locality of the laryngeal centre for phonation is one of the most disputed subjects in neurology. The general opinion is that there is a cortical centre and that it is situated at the base of the third frontal and antero-inferior portion of the ascending frontal convolution in each hemisphere. But the opinion regarding the manner in which these centres influence the terminal organ is very different. Some (Masini) suppose that each of these centres acts upon the vocal cord of the opposite side; others (Krause, Semon and Horsley, Broeckaert) claim that each hemisphere acts simultaneously upon both vocal cords. According to Masini excitation of one of these centres causes adduction of the opposite cord, extirpation of one causes fixation in abduction. According to other writers excitation of one centre produces adduction of both cords, while extirpation has no influence on the movements of the larynx, inasmuch as the remaining centre is sufficient for the control.

Raugé demands the reason for the rarity of cortical laryngeal paralysis, as hemiplegia and motor aphasia are so common. If the laryngeal centre occupies a zone similar to that of Broca's, it must be liable to the same vascular lesions, and being bilateral its involvement ought to be twice as common as motor aphasia or as frequent as hemiplegia. Semon and Horsley consider a unilateral paralysis impossible, and believe that a bilateral paralysis occurs only after a lesion in each hemisphere. There are a few well-observed cases with autopsy (Garel, Dejerine) of unilateral

laryngeal paralysis from a limited cortical lesion, for which reason Raugé refuses to accept the view of Semon and Horsley, and considers cortical laryngeal paralysis rare because not observed.

Pierre Marie has chosen cases of hemiplegia associated with disturbances of speech, especially with dysarthria, or with dysphagia or paralysis of the soft palate, as these gave more reason to expect involvement of the larynx. Dr. Simerka has examined these twenty-three men. The time which had elapsed since the attack varied from one to eighteen years. In nineteen of these cases no involvement of the vocal cords was observed; in four there was less movement of the right cord in respiration and phonation, causing a deviation of the glottis towards the left side. Three of these patients had right-sided, the fourth left-sided, hemiplegia, all four presented contractures and dysarthria. The trouble might be considered a paresis of the abductor or hyperexcitation of the adductor muscles. The location of the lesion might be cerebral, bulbar, or peripheral.

These investigations show that laryngeal paralysis is not uncommon because overlooked, and are confirmative of the view of Semon and Horsley.

PATHOLOGY.

IN CHARGE OF ALLEN J. SMITH, A.M., M.D.,
Professor of Pathology in the Medical Department of the University of Texas, Galveston, Texas,
AND
HENRY W. CATTELL, A.M., M.D.,
Demonstrator of Morbid Anatomy in the University of Pennsylvania; Prosector to the American Anthropometric Society; and Pathologist to the Presbyterian Hospital, the Institution for Feeble-Minded Children at Elwyn, etc.

A Rapid and Convenient Method of Preparing Malarial Blood-Films. (*British Medical Journal*, July 18, 1896.) By Patrick Manson, M.D.

The following method of preparing films of malarial blood will be appreciated by those who have practical experience of the ordinary methods of making cover-glass films. Besides ease and rapidity the method has other and obvious advantages.

A nurse is instructed to cleanse with spirits of wine or ether as many microscope slips as are likely to be required, and to place them, arranged in one or more rows, on a table near the patient. Three or four oblong slips of very fine clean tissue-paper, one and one-half by five-eighths inch, are also prepared. The patient's finger is cleansed, and pricked in the usual way. A droplet of blood about one-sixteenth inch in diameter is then expressed from the puncture and taken up, by touching it with one of the papers, the blood being supplied about one-half inch from the end of the paper. The charged surface of the paper is then placed upon a glass slip rather towards one end. In a second or two the blood will have run out in

a thin film between paper and slip. When this has taken place—not before—the paper is drawn along the surface of the glass. The same paper, without recharging, is placed in a similar way on a second slip, on a third, on a fourth, and so on. When exhausted, the paper is recharged from the finger as many times as may be found necessary. In this way fifty or one hundred exquisitely fine films may be prepared in five or six minutes. Labels are then attached, and the slides stored away to await convenience. Before proceeding to stain, the blood is fixed in a little absolute alcohol on the films. The slides are then dried, and stained by the borax (five per cent.), methylene blue (one-half per cent.), a few drops of the solution being applied for about half a minute. After washing and drying, cover-glasses with xylol balsam are applied. The result is excellent. If one wishes to search for crescents, a good plan is to make the films fairly thick, to fix with alcohol, and then to wash out the hæmoglobin with very weak acetic acid, two or three drops to the ounce of water. The now colorless film is again washed, stained with methylene blue, and mounted in xylol balsam in the usual way. The field not being obscured by blood-corpuscles, the large amount of blood which this method of preparation enables us to pass rapidly in review greatly favors the quick finding of any crescents that may be present. The same method of preparing blood films is equally applicable for the demonstration of other blood parasites.

On Meat-Poisoning. (*Medical Chronicle*, July, 1896.) By J. Dixon Mann, M.D., F.R.C.P.

Apart from added poison and from parasitic disease, meat may become poisonous in three ways: from the presence of disease in the animal at the time of slaughter; from micro-organisms which attack or develop in meat after slaughter; and from the presence of ptomaines. With the two first classes there may be a considerable period of incubation between the eating of the food and the commencement of symptoms; in the other class there may be a prolonged period of incubation, if the meat after slaughter has been invaded by pathogenic micro-organisms. The author groups the symptoms produced by poisonous meat in two divisions,—those due to a true infection and those due to simple poisoning. In the first division the symptoms run the usual course of an infective disease. A case is recorded by Walder (*Inaugural Dissertation*, Leipzig, 1879) in which six hundred persons were attacked after eating the flesh of a calf which was killed when moribund: the symptoms comprised headache, anorexia, photophobia, delirium, meteorism, and enlargement of the spleen and the inguinal glands. Six died, the post-mortem appearance being that of typhoid fever. In the second group the symptoms usually resemble those of gastro-enteritis, with subnormal temperature; sometimes the temperature is elevated. Some toxines produce special symptoms. An atropine-like base has been described by Anrep (*Arch. slaves de Biologie*, 1886) as having been met with in decomposing meat, most frequently in the sausages largely eaten in Ger-

many, and in certain kinds of fish, as sturgeon. The toxine contained in the same meat may cause different symptoms in different people. An instance is related of ninety-seven persons who ate the meat of a cow which when slaughtered was ill of hemorrhagic enteritis. They were seized with symptoms like cholera, within four to forty-eight hours. Nearly as large a number ate of the same meat without any ill effects. It is to be remembered that some animals are insusceptible to some toxins. Gärtner (*Thüringer ärztliches Correspondenzblatt*, 1888) examined some beef derived from diseased cow, which had caused an outbreak of meat-poisoning, and found in it characteristic bacteria. Dogs and cats ate of the meat without being affected, while rabbits, mice, guinea-pigs, a horse, and a goat were made ill by it, some dying. It has been observed in several cases that if the flesh of an animal, in a certain stage of septic disease when slaughtered, be eaten shortly afterwards, there may be no ill effects; but if kept for several days it becomes toxic, producing the usual symptoms of meat-poisoning in those who eat it. Meat may be infected with bacteria after it has been cooked, as well as in the raw state. In some cooked meat which had been kept in an ice-safe *B. proteus vulgaris* has been found, these micro-organisms having been previously present in the safe. Foster (*Centralblatt für Bacteriologie*, vol. xii.) has shown that certain bacteria not only live in melting ice, but also grow in it. The temperature of an ice-safe is usually several degrees above the freezing point; hence some of the putrefactive bacteria, if accidentally introduced into the safe, may multiply and contaminate the meat. The percentage of deaths is difficult to estimate, as the number of persons attacked is frequently not stated, the fatal cases only being recorded. The wide variation in the morality of outbreaks is very striking,—ranging from twenty-six per cent. down to zero. The table given in a recent number of the *British Medical Journal* (1894, vol. ii. p. 725) shows a mortality of about 4.3 per cent. Regarding preventive measures relating to meat-poisoning, the author especially advocates a stringent supervision of the lower class butchers, particularly in large towns, who are apt to buy diseased and even dead animals, which are converted into meat and sold at cheap prices to the poorer classes. In private houses the cellars, larders, and all places where meat, cooked or uncooked, is stored, should be kept clean, dry, and well ventilated; they should have no communication, direct or indirect, with drains. The author calls attention to the danger of buying meat already cooked, such as potted meats; these being cooked in large masses there is danger that the heat which ordinarly applied in the cooking process will kill disease-germs has not in these large pieces reached fully and equally every part of the meat,—an objection of especial force if spores be present, as they are more resistant than the micro-organisms themselves.

The Trichophyton Fungus. (*Archiv für Dermatologie und Syphilis*, vol. xxxv. Nos. 1 and 2.) By Rudolf Krösing, of Stettin.

1. Sabourand's division of the trichophyton fungus into small and large

spores, megalospores and microspores, does not appear to Krösing to be correct, as the size of the spores in the same fungus and in the same growth differs widely. In differentiating the human trichophyton according to locality the same remark applies to the head, beard, and non-hairy portions of the body.

2. In order to secure a pure culture the mycelial threads are separated by energetic agitation, preferably with water. The rubbing of the hairs, crusts, pus, etc., with silicic acid (Král's method) is not applicable in every case.

3. The attempt of Furthmann and Neebe to differentiate the varieties of this fungus by microscopic study of the cultures is not practicable; study of their macroscopic appearance seems to be the more suitable method. In order to accomplish this the conditions of nutrient media, temperature, and age, an amount of aqueous vapor in the air must be the same. Dissimilarity in any of the above makes a comparison unreliable. Potato cultures are most suitable for comparison, and we may consider the composition of healthy potatoes as constant for this purpose.

4. According to this method the fungi are divisible into three groups:

(*a*) Those showing a dry, pulverulent deposit, with a brownish coloration of the potato at the border of the culture.

(*b*) Those showing conditions similar to the above, without any coloration.

(*c*) Those with white downy deposit without coloration.

5. Superficial and deep affections (sycosis and trichophytia carcinota) may be caused by the same variety. Suppuration may be produced by the trichophyton alone without the presence of other organism.

6. No differences in the cultures were noticed in markedly acid or alkaline media, with or without the presence of oxygen, and no change or reaction was noticed in the media.

7. Guinea-pigs inoculated subcutaneously with fungi obtained from different places did not show the clinical features of sycosis. Subcutaneous *einverleibung* give nodular growths.

Preservation of Macroscopic Specimens.—Tores (*Centralblatt für allgemeine Pathologie und pathologische Anatomie*) describes a method, which he has tested for a year and a half, of preserving organs and tissues so that they retain the color they had when fresh. He finds that five to ten parts of a forty-per-cent. solution of formalin alone cause the organs after a time to assume a tint which differs very considerably from the natural color, but that if, instead of water for diluting the commercial formalin solution, a solution of one part common salt, two parts of magnesium sulphate, two parts sodium sulphate in one hundred parts of water be used, the color of the blood is well preserved. Further, material preserved in such a solution is better adapted for subsequent microscopic examination, since the protoplasm of the cell is less altered and the nucleus stains better and more deeply. The method he adopts is as follows: The material must be not

too long washed in water, and should be left in the formalin solution for a period depending upon their size and thickness. A kidney or spleen requires two days' immersion, and the solution should be changed once or twice, or until the formalin solution no longer gives a dirty brownish-red color. Care must be taken to bring all portions of the object into contact with the solution, and the object must be given the shape which it is to retain permanently, since the formalin solution causes it to assume a consistency such that its shape cannot afterwards be modified. In the formalin solution the organs change color and become of a dirty bluish gray. On now placing them in ninety-five per cent. alcohol the normal color returns. Before permanently placing the organ in alcohol it must be washed with alcohol until the latter no longer becomes cloudy. The material must not be washed with water; it is left in alcohol for a varying time until the normal color has again fully returned; if left longer the alcohol removes the color. For a kidney or spleen twenty-four hours will be sufficient. The permanent preserving fluid is equal parts of glycerin and water; the material floats at first, but sinks later; the color is now at its best; after a little time the fluid becomes yellowish and requires renewal. Tissues so preserved have not undergone the slightest alterations in color during nine months. The method is not applicable to the preservation of other color than that of blood; thus icteric liver is not well shown.

FORENSIC MEDICINE.

IN CHARGE OF LORENZO D. BULETTE,
Of the Philadelphia Bar.

POWER OF CORONER TO ORDER A POST-MORTEM EXAMINATION WITHOUT CONSENT OF THE FAMILY OF THE DECEASED.

WHERE death has followed an injury which seems to the coroner insufficient alone to produce death, he may, without the consent of the family of the deceased, lawfully order a post-mortem examination to be made; and such post-mortem examination, so made by a medical examiner in obedience to the requirements of such coroner, does not render him liable for mutilating the body without the consent of the family of the deceased, where the operation was performed with ordinary decency, without wantonly disfiguring the body.

The law was so laid down by the Court of Appeals of Maryland, in

the recent case of Blank *vs.* College of Physicians and Surgeons,[1] which arose as follows: The plaintiff, who is the widow of the deceased, brought suit against the College of Physicians and Surgeons of A. city, Doctor L. and Doctor H. In her complaint, she averred that the body of her deceased husband was wrongfully and unlawfully taken in charge by the defendants and cut and mutilated, and used as a subject for the students of the defendant college without warrant of law; and that the defendants wrongfully and unlawfully detained the dead body from burial, when demanded for that purpose by the plaintiff; and that the cutting and mutilation of the body were done secretly and clandestinely, in order to afford instruction to the students of the college, and without the consent of the plaintiff or any one acting for her.

The damage alleged to have been caused by these acts was great mental excitement and distress and bodily suffering on the part of the plaintiff. Demurrers by each of the defendants presented to the court the question whether these facts as here alleged gave the plaintiff a cause of action. The court overruled the demurrers, and the case was tried before a jury, who returned a verdict in favor of the defendants, and from the judgment entered thereon the plaintiff appealed.

From the evidence produced at the trial, it was shown that the deceased while engaged in coupling cars on a steam railroad sustained a very severe injury; his right leg was mashed below the knee, and the injured portion almost severed from the body, retaining its connection with it only by a few threads of tissue. The wounded man was a strong, stout man of good nerve and able to work.

His widow, the plaintiff, testified that he never lost any time from his work; and one of his fellow-laborers testified that he had worked with him five years, and that he lost no time. He was sent to the city hospital, where he died the next day. The College of Physicians and Surgeons supplies the medical and surgical service to the city hospital; and the patient was under the care of a resident physican who was appointed by the college. After his death a post-mortem was ordered by Doctor H., one of the defendants, and was conducted by Doctor L., another of the defendants. The post-mortem was made in a room belonging to the College of Physicians and Surgeons, where such examinations are usually made; and the two physicians just named are connected with the college, Doctor L. being a member of the faculty. The post-mortem was made without the consent of the plaintiff, the widow of the deceased, or any member of his family. Evidence was offered on the part of the plaintiff for the purpose of showing that the body was wantonly cut, mutilated, and disfigured, and the feelings of the relatives of the deceased inhumanly outraged.

On the part of the defendants, it was shown that Doctor H. was one of the coroners of the city of A., and that Doctor L. was the medical examiner

[1] 81 Md. 358.

appointed by the board of health; also, that the post-mortem was ordered by Doctor H., as coroner, and performed, in obedience to his orders, by Doctor L.

Doctor H. testified that he ordered the autopsy because he wished to know the cause of death; that it had been reported to him that the man's leg had been cut off by the train, and that he was brought to the hospital, and that he did not think that the loss of the leg in this way sufficiently accounted for the death, and that he could not give the death certificate without having a post-mortem. Doctor L. testified that he did not think that in the majority of cases persons in ordinary health when the leg was crushed below the knee would die from shock. Doctor Y. testified that if a healthy man should have his leg crushed off he would not think it a sufficient cause to explain the death, and in such case, if his official duty required him to give a death certificate, he would make every effort to obtain a post-mortem, and that it was so unusual for a death to occur from accident under conditions surrounding the deceased that other explanations were more probable. Doctor N. testified that when a man's leg is cut off below the knee, and he dies within thirty-six hours after the injury, the accident would not be an entirely satisfactory explanation of the death, if the man was ordinarily healthful and muscular; and if he was required to determine definitely the cause of death in such a case, he would not consider that he had done his duty without an autopsy.

Doctor L. described his proceeding in making the autopsy, the taking out of the brain, the opening of the body, the removing and cutting into the different organs, the liver, spleen, kidneys, lungs, and heart. He testified that you have to examine all the vital organs to see the cause of death, and that the cause of death was persistent heart shock; that the deceased had fatty kidneys, and fatty degeneration of the heart; that the injury itself was not of such a nature as should have caused persistent heart shock, unless there was something else besides the injury which helped to produce it; that the crushing of a man's leg below the knee was not such a thing, in his opinion, as would produce persistent heart shock. Doctor Y. and Doctor N. testify that to make a complete examination it is necessary to remove and open the brain. In short, the professional testimony in the case all tends to show that the autopsy was conducted in the usual manner.

By a public statute, the governor is authorized to appoint four coroners for the city of A. Inquests are required to be held whenever a person is found dead and the manner and cause of death shall not be already known as accidental or in the course of nature. There are other duties which coroners in the city of A. are required to perform. The municipality has the power to pass ordinances to preserve the health of the city and to prevent the introduction of contagious diseases therein. In pursuance of this power a board of health has been established, and many ordinances have been passed for the purpose of detecting and preventing the causes of diseases and removing them when they are found to exist. The board of

health is authorized and required to appoint a medical examiner, and it is made his duty to make post-mortem examinations in any part of the city when called upon by either of the coroners or the board of health. Furthermore, it is enacted that "when any person shall die in the said city, it shall be the duty of the physician who attended during his or her last illness, or the coroner, when the case comes under his notice, to furnish within forty-eight hours after the death . . . a certificate setting forth, as far as the same can be ascertained, . . . the cause, date, and place of death."

Mr. Justice Roberts, in delivering the opinion of the Court of Appeals, said, "The object of this last provision is obvious. The spread of infections and contagious diseases is very apt to occur in thickly-settled communities. It is, therefore, the part of wisdom to watch with vigilance every indication of their approach, and to investigate the causes which might, in any probability, produce them. The causes of death must be ascertained, so that means may be adopted for the prevention of other deaths from the same sources. The evidence before us exhibits the case of a public officer whose duty it is to find out and certify the cause of a death which is brought to his notice. The accident preceding his death, and disabling him, is not, in his opinion, sufficient to cause the death of a healthy person. There must, therefore, as he thinks, be some diseased condition of the injured man which contributed to bring about this result. His opinion is shared by other reputable physicians who have testified in the case. He could not honestly and conscientiously give the certificate which the law required him to give unless he made the proper inquiry into the case. In his judgment, and in the judgment of the professional witnesses, proper and sufficient inquiry could not be made without an autopsy. So far as the evidence in the case shows, or any rational inference from it, the coroner did simply his plain and positive duty in ordering the autopsy. And the medical examiner, Doctor L., was equally obliged by his duty to obey the order of the coroner."

On the prayer of the defendants, the trial court gave to the jury the three following instructions:

"*First.* There is no evidence in this case to show that the College of Physicians did any of the alleged wrongful acts mentioned in the declaration or ratified the same, and therefore their verdict must be for the defendant.

"*Second.* There is no evidence legally sufficient to show that the defendant, Doctor H., participated in any way in the commission of the alleged wrongful acts mentioned in the declaration, further than as coroner of the State of Maryland to order the post-mortem examination to be performed, and that there is no evidence legally sufficient to show that in ordering the post-mortem examination to be performed he acted wantonly, maliciously, or corruptly, and therefore the verdict must be for the said defendant, Doctor H.

"*Third.* If the jury believe that the defendant, Doctor L., performed

the post-mortem upon the body of the deceased at the order of Coroner H., as the city examining physician, and that in performing said post-mortem he treated the body with ordinary decency and did not wantonly disfigure the same, he acted within the scope of his official duty, and the verdict must be for the defendant, Doctor L."

In passing upon these instructions, the Court of Appeals said, "The College of Physicians and Surgeons permitted its room to be used for the post-mortem examination, but appears to have had no further connection with the matter. The post-mortem was a lawful proceeding. If anything irregular or improper occurred in the prosecution of it, the college took no part in it. The same thing may be said in reference to the coroner. The question regarding the charges which alleged the wanton mutilation of the body was fairly left to the jury in the last instruction. The prayers offered on the part of the plaintiff were inconsistent with those granted by the court, and were properly rejected. As the jury have acquitted the defendants of the charges made against them, it would seem to be rather an abstract question to consider what would have been their responsibility in a civil action if they had been found guilty." The court at the same time added, "It is to be hoped that few persons in a civilized country would wantonly mutilate a dead body, or would without warrant of law attempt to prevent surviving friends and relatives from performing the rites of Christian sepulture. Such acts would manifest a great depth of depravity." And the judgment of the lower court exonerating the defendants from liability was affirmed.

BOOK REVIEWS.

De L'Aphasie Sensorielle (Sensory Aphasia). By Charles Mirallié, M.D. Paris: G. Steinheil, 1896.

One of the most important contributions to the subject of aphasia is given in this work from the laboratory of Dr. Dejerine. The author begins with the methods to be employed in the study of a case of aphasia, after this he gives the history of the affection and a short chapter on the etiology. A lesion of the Sylvian artery is a common cause, and is frequently the result of mitral stenosis. An area of softening is usually found at the autopsy.

As far back as 1874 Wernicke described a symptom complex characterized by word-deafness and word-blindness with paraphasia and agraphia, and attributed this to a lesion of the posterior third of the first temporal convolution. In all the cases in which an autopsy has been obtained destruction of the first temporal or of the angular gyrus of the left side has caused word-deafness and word-blindness, with predominance of one or the other, associated with disturbance of speech and writing. Agraphia and paraphasia are constantly found in these lesions. There is but one form of sensory aphasia, as Wernicke has shown.

Sensory aphasia may begin acutely or gradually, and usually there is no paralysis of the limbs, occasionally there may be slight temporary right hemiparesis. In rare cases it develops in successive attacks until it finally becomes permanent. The degree of word-deafness varies: usually the patient recognizes his name, and sometimes a few well-known words; he may catch a familiar word and guess a question correctly. If, however, the same word is used in another question the deception is detected. When several languages have been spoken the one most familiar is the one most apt to persist, and if all are lost this is the first to return. The centres for music are distinct from those for speech, but are located near the latter, and yet involvement of one set may occur without the other.

In word-blindness the value of symbols is perfectly preserved. One of Dejerine's patients was incapable of reading the words République Française, but he recognized at once the meaning of the letters R. F. presented in the manner so commonly seen in France. A person may have word-blindness without letter-blindness, and he is usually able to recognize his name when written, and sometimes a few familiar words, as in word-deafness. He may read some one word correctly and guess at the meaning of the sentence, but the deception may be detected in the same manner as in word-deafness. The ability to read letters persists after the loss of the understanding of words, because letters are first learned and have made a deeper impression. Memory of figures is usually in part preserved. Optic aphasia (inability to name an object by sight alone without the employment of the other senses) may be found in sensory aphasia; psychical blindness (in which the patient does not recognize a person or object) may also be present. Optic aphasia and psychical blindness have been observed only in sensory aphasia.

True paraphasia is very rare. In this form every word uttered is well known and complete, but the combination of these words conveys no meaning, or, at least, only an imperfect one. A sensory aphasiac may recognize his name when written or spoken and yet be unable to pronounce it himself; this is because every one hears and sees his name constantly from early childhood, and the impression produced is lasting, whereas one seldom has occasion to pronounce his own name, and the motor image of articulation of the name is not so durable.

As the sensory aphasiac usually has preservation of all movements, spontaneous writing or that from dictation is easily tested, and is always found impaired during the greatest development of the disease. Often he can only write his name spontaneously, and he may write this better than he can copy it when written, or he may in rare cases show paraphasia or jargon aphasia in writing. Figures are usually better written. He copies servilely, mechanically, as one would copy hieroglyphics, and requires a long time. Right lateral homonymous hemianopsia is frequent in sensory aphasia, but depends entirely on the depth of the lesion, and is only present when the optic radiations are cut. The intellect is usually more affected in sensory than in motor aphasia, and the pantomime is always lessened.

When the supramarginal, angular, and posterior parts of the first temporal gyrus are destroyed the sensory aphasia is complete, and the patient usually remains for the balance of his life with word-blindness, word-deafness, paraphasia, and agraphia. If the lesion predominates in the angular gyrus the word-deafness becomes less, but never disappears completely, and the patient is usually hemianoptic. If the lesion predominates in the first and second temporal gyri word-deafness persists, the patient has paraphasia, word-blindness which may be difficult to demonstrate, and total agraphia.

Word-blindness and word-deafness are simply subvarieties of Wernicke's one form of sensory aphasia, and it is exceptional for either to exist alone from the beginning of the disease. Persons once afflicted with sensory aphasia seldom if ever fully recover the intellectual faculties; speech may be restored, but some impairment always remains. The prognosis of sensory aphasia is more grave than of

motor aphasia: the latter may fully disappear. Either form of aphasia, if it occurs in childhood, usually completely disappears.

"Pure" sensory aphasia (in which only one of the elements of speech has been lost and the word-concept is perfect) does occur. In these forms the speech zone is intact, it is only deprived of one of its connections with the motor, visual or auditory cortex. In pure word-blindness the loss of understanding of printed or written words is the same as in ordinary sensory aphasia, but the visual images are intact. The patient can, therefore, write perfectly, but cannot read his writing; he copies mechanically, and as much like the model as possible; he understands all said to him, and speaks as a normal individual. Usually the blindness is both verbal and literal. In this form of aphasia the patient may recognize written words by tracing the lines with his finger, as in this way he influences the visual images which are not destroyed but merely incapable of being aroused by the ordinary method of sight. Hemianopsia has existed in all the cases published. The ability to read figures may be preserved or lost. Intelligence is perfectly intact. Dejerine has published the first autopsy of this form. The cause is to be found in destruction of the tracts which unite the right and left general visual centres with the left angular gyrus.

In "pure" word-deafness (Serieux) the understanding of the spoken word is lost, but all the other forms of speech are perfectly intact. In subcortical ("pure") motor aphasia, the power of articulation of words is lost, but the patient knows perfectly the words he wishes to say; he is able to indicate the number of syllables in a given word; he understands spoken and written words, and writes like a normal individual.

Sensory is easily distinguished from motor aphasia. The sensory aphasiac is verbose (jargon aphasia); the motor aphasiac only has a few words at his disposal; word-blindness is less marked in motor aphasia, word-deafness is absent or only detected by most careful examination; agraphia is complete except for a few familiar words; the ability to copy is preserved, and the printed word is transcribed as script which represents an intellectual act; the sensory aphasiac, on the other hand, makes an exact copy in every detail.

Dejerine believes the so-called transcortical motor aphasia, characterized by better articulation of repeated words and of song than of spontaneous speech, is merely a stage of amelioration in the cortical motor aphasia. There is not a single well-observed case of the so-called transcortical sensory aphasia.

The curious condition of dyslexia, which is intermittent alexia, in which the patient must stop and rest after reading a few words, is probably due to functional ischæmia of the angular gyrus.

Mirallié considers that one writes by reproducing on paper the images stored up in the angular gyrus. Agraphia results whether the lesion is in the visual, motor, or auditory centre. Every alteration of the speech-zone causes agraphia, and there is no necessity for assuming a special centre for writing.

If psychology admits four elements in a word, it does not follow that each corresponds to a distinct centre in the brain. The educated individual, when he speaks or writes, employs the same centres as a child in learning. That an hysterical patient may be made word-blind without being made agraphic, or *vice versa*, is not a proof of a graphic centre; it is simply the result of suggestion. A case of "pure" agraphia has never been clearly demonstrated. Arguments against the theory of a centre for writing are: The existence of agraphia due to a lesion of the angular gyrus is well known. Every destruction of the motor images of articulation causes agraphia and alexia. Bar's case is the only one in which a lesion was limited to the foot of the second frontal convolution, and it caused motor aphasia as well as agraphia. Agraphia results from an alteration in any part of the speech-zone. There is not a single example of "pure" agraphia independent of motor or sensory aphasia. If the centre

for writing exists, agraphia alone should have been present in Bar's case. In such a case as that reported by Mlle. Skwortzoff, in which the patient was only able to write spontaneously the words he was able to pronounce spontaneously and to understand in reading, it is necessary to suppose that a lesion had destroyed exactly similar visual, graphic, and motor images if the theory of independent centres is to be accepted. This observation is rather in favor of the intimate connection of the centres, and the involvement of all in a lesion of one. One can write with many parts of the body. If there is a centre for writing it must comprise all the psychomotor zone, and one must admit a centre for all the specialized movements of the body. The advocates of a special centre for writing do not regard it as a simple motor centre. Charcot considered agraphia as aphasia of the hand,—as amnesia of the graphic images. The entire question hinges on the existence of graphic images, and if there is a centre for these images, destruction of it ought to involve all forms of writing (Dejerine). In motor aphasia spontaneous writing is absent, but copying is preserved, and yet the same movements are made in both. Left-handed people usually write with the right hand; when such a person becomes motor aphasic he is hemiplegic on the left side, and the right hand has lost the power of writing, although it has preserved all other movements. There are no autopsies of this form reported. One might suppose the existence of two lesions, one in the right hemisphere which had caused the hemiplegia and motor aphasia, and one in the left hemisphere which had destroyed the centre for the graphic images. Such a supposition is untenable.

Mirallié, in order to ascertain if the loss of the ability to write is dependent on the destruction of the graphic images, or whether one writes by transcribing on paper the visual images stored up in the angular gyrus, and if agraphia is not merely an alteration of the word-concept, experimented with separate letters, as has been done by others. His cortical motor aphasiacs were unable to spell words with the blocks. The agraphia, therefore, in cortical motor aphasia, does not consist in the inability to trace letters on paper: it is not a loss of graphic images, but results from the impossibility of evoking the concept of words and letters. For this reason the cortical motor aphasiacs cannot spell better with separate letters than they can write with a pen.

Charcot's conception of the speech-zone was as follows: there are four centres,—one for the motor, one for the graphic, one for the visual, and one for the auditory images. Although they are united, education may give a predominance to one of these centres, and one may be employed especially in the process of thought. Those who employ all in equal degree are said to be indifferent. This view Mirallié cannot accept.

Freud's idea that the associative tracts play the most important part in aphasia is not grounded on facts. The existence of centres for word-hearing, word-seeing, and articulation is admitted by all authors. These are located in the left hemisphere alone, except in left-handed persons; the motor centre of articulation occupies the foot of the third frontal convolution; the auditory and visual centres are located at the posterior part of the first temporal and in the supramarginal and angular gyri. Freud gave the name of "zone of speech" to these convolutions. Any lesion of any one of these three centres involves the function of the other two.

Mirallié reports sixty-two carefully observed cases of sensory aphasia,—fifty-eight with autopsy. Most of these are known in the literature; a few have never been published, and others have been studied by the author himself. One very important observation made by Mirallié, and given at length, is a case of sensory aphasia with temporary right hemiparesis, considerable amelioration of word-deafness, complete alexia, paraphasia with jargon aphasia very pronounced for spontaneous and repeated words, total agraphia (the patient could not even write his name), no psychical blindness, no optic aphasia. Hemianopsia could not be tested.

Autopsy.—Macroscopic appearance: Lesions of the supramarginal and of the adjacent part of the angular gyrus, and of the lower part of the parietal lobe of the left side. Microscopic appearance: Large area of softening in the posterior marginal fissure of the island of Reil, destruction of the lower part of the parietal lobe, destruction of fibres passing to the angular gyrus, small primary area of softening in the cortex of the angular gyrus, another area in the white matter of the ascending frontal convolution, descending and retrograde degeneration in the optic radiations, inferior longitudinal fasciculus, pulvinar and external geniculate body, degeneration in the internal capsule and crus.

W. G. S.

ITEMS OF INTEREST.

A Use for Patent Medicine Literature.

It is a favorite axiom of the optimists that everything has its uses. But it has remained for the New Mexico Territorial Board of Health to find a new use for the patent medicine almanac. In a recently issued circular on the prevention of consumption, among other things, it advises that "every person so affected should spit into some receptacle and should see that the sputum is soon destroyed by fire. About the house there is no better way than to spit between the leaves of patent medicine almanacs,—to be had freely at all drug-stores,—and after a half-dozen or more spittings, burn the book." —*Journal American Medical Association.*

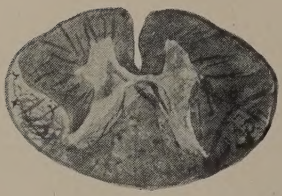
Prince Bismarck, M.D.

On the occasion of the twentieth anniversary, on July 16, of the opening of the Imperial Office of Health, the Faculty of the University of Jena conferred upon Prince Bismarck the honorary degree of M.D. The diploma is on parchment, and the seal of the Faculty is contained in a capsule of oxidized silver, on the front of which are the Prince's arms in relief, crowned by Æsculapius and Minerva, with the date July 16, 1896, beneath. The reverse is adorned with a representation of the market-place of Jena, with the Bismarck Fountain and the inscription "Jena, July 30, 31, 1892." The diploma and the capsule are contained in a cylinder of embossed leather, partly gilt and partly painted in bright colors. The top is decorated with the Prince's arms, and the bottom with the insignia of the degree of Doctor of Medicine, both wreathed with laurel and ivy. Prince Bismarck is now possessed of all the doctor's degrees that the German Universities can bestow.—*British Medical Journal*, July 25, 1896.

C. 1.

C. 2.

C. 3.



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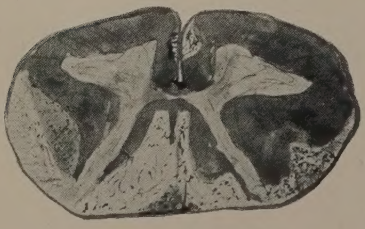

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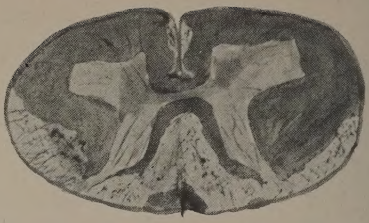

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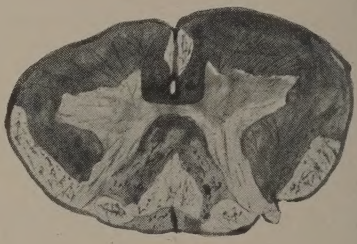

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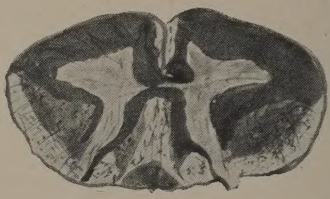

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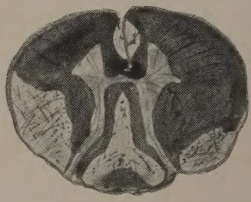

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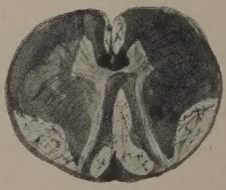

D. 4.